

MARINE REVIEW

Entered at Cleveland Post Office as Second-class Mail Matter.

VOL. XXIII.

Published every Thursday at 418-19 Perry-Payne Bldg., by the Marine Review Pub. Co.

CLEVELAND, O., FEB. 21, 1901.

Subscription \$3.00 a year.
Foreign \$4.50 a year.

No. 8

SAMPLES OF SCOTCH SHIP BUILDING.

SOME RECENT PRODUCTS OF THE CLYDE—FINE CARGO STEAMERS THAT EMBODY THE BEST PRACTICE IN MODERN SHIP BUILDING.

[Special correspondence to the Marine Review.]

Glasgow, Scotland.—It is still a moot point whether Scotch ship builders will or will not increase in activity as the year progresses. They are certainly well employed up to this time, although they have not booked very many important contracts since the year opened. In the first few weeks of the new century, however, the output of the Clyde ship yards has included a few notable items, of which some little description will be of interest to all American readers concerned directly or indirectly with shipping.

First, then, the Anchor line has made another addition to its well-known fleet, so specially related to America. Messrs. D. & W. Henderson & Co. of the Meadows side ship yard, who have built most of this fleet (if not the whole of the additions to it within the last dozen years), have recently launched the Numedia, a steel screw steamer of 470 ft. length, 55 ft. breadth and 33 ft. depth. This vessel is to be fitted with triple expansion engines by the same firm, with cylinders of 29½, 47 and 78 in. diameter respectively and 4 ft. 6 in. stroke, and with three large double-ended boilers and a donkey boiler. She will also have thirteen powerful steam winches, one of which is placed on the poop for warping the vessel in and out of berth. In the interior arrangements special attention has been devoted to means of facilitating the rapid handling of cargo, and also to adaptability for army transport purposes. The 'tween decks are exceptionally lofty, so that they may be used for cavalry transport, although, of course, the ship is primarily meant for commerce, not for war service. All the passenger saloons, staterooms and officers' rooms are on the bridge deck. The staterooms are two-berthed only, and are exceptionally roomy and well ventilated, the Numedia being intended for the Indian service of the company. The cubic capacity for cargo and coal is 13,000 tons and the carrying capacity for cargo is 9,500 tons dead weight. This is the second vessel of this type built at Meadows side, where also are being built two large boats for the Glasgow and New York, and two for the Mediterranean and New York services of the Anchor line.

From the historic yard at Govan, known as "Napier's," Messrs. Wm. Beardmore & Co. have first launched a remarkable vessel for the River Platte trade, and without exception the finest vessel ever seen in that trade. She is named the Highland Brigade, and is 400 ft. long by 50 ft. broad by 29½ ft. deep. Her tonnage is 7,000. Hull and machinery are up to Lloyd's and Board of Trade highest requirements. The hull is on the "deep web frame" principle, without stanchions but with extensive girders, by which means additional space is secured for stowage. There is a cellular double bottom fore-and-aft which can be used either for fresh water or for water ballast, as may be required. A complete shelter deck is secured by closing in the spaces between the topgallant fore-castle and the bridge, and between the bridge and the poop, and within this shelter, as in the 'tween decks, an immense number of live cattle and sheep can be stowed. With this object the highest care and ingenuity have been exercised to secure perfect ventilation. A large space has been insulated on the most modern principles for the carriage of 80,000 carcasses of mutton. The refrigerating machinery (ammonia) is supplied by Linde & Co., London, and is placed on the main deck immediately abaft the engine room. It can be adapted to the requirements of any cargo needing any low temperature, whether meat, fruit or dairy produce, and it is on such a scale that the brine pipes if put end to end would stretch about nine miles. The insulation is of charcoal. The saloon is in the deck-house and has handsome accommodation for first-class passengers. There are six cargo winches of Wilson's patent and a powerful windlass by Emerson, Walker & Thompson. The ship's two masts are fitted with derricks for cargo working and heavy weights. The engines are triple expansion, the cylinders being 30, 50 and 80 in. diameter, working on three cranks, each 54 in. stroke. There are four single-ended boilers, with twelve furnaces, worked under Howden's forced draft, with a working pressure of 200 lbs. per square inch. The Highland Brigade is to steam 13 to 14 knots and will be placed this spring by her owners (Messrs. H. & W. Nelson, Liverpool) in the Liverpool and River Platte trade. The evaporator and distilling plant, on Quiggins' principle, are supplied by the Liverpool Engineering & Condenser Co.

A recent product of the Govan ship yard of the London & Glasgow Engineering & Ship Building Co. has had her steam trials on the Clyde this week, namely, the Glen liner Glenroy. This vessel is 400 ft. long by 49 ft. broad by 31 ft. deep, molded, and she carries 7,100 tons dead weight. She is designed for the China trade and is fitted with eleven powerful steam winches and all the most modern appliances for the rapid loading and unloading of cargo. The triple expansion engines have cylinders of 29, 47 and 76 in. by 48 in. stroke, and they easily developed 13½ knots on the official trial.

Another very interesting trial of late has been that of the Port Morant, built by Messrs. Alexander Stephen & Sons, Linthouse, Glasgow, for the new imperial mail, fruit and passenger service which Messrs. Elder, Dempster & Co. are establishing between Bristol and the West Indies. This vessel, of very fine lines, is more like a yacht than an ocean carrier. She measures 320 ft. in length, 28 ft. in breadth and 40 ft. in depth, and with her fine engines she easily developed 17 knots on her trials. The special characteristic of this vessel is the refrigerating installation for the carriage and preservation of fruit. This is on a novel principle. A cool current of air is made to circulate through the holds. This current is cooled and purified by passing over a cooler of special construction, the design of Messrs. J. & G. Hall. The powerful refrigerating machine is on the duplex system of that firm, by which cold brine is cir-

culated by means of pumps through the air coolers, fore-and-aft. By this installation it is expected to solve the problem of transporting tropical fruit (especially bananas) in perfect condition from the West Indies direct to the British consumer. The run from Jamaica to Bristol will be covered in twelve days. There is excellent accommodation also for 45 first-class and 15 second-class passengers, with special adaptability to both a temperate and a tropical climate. Comfort is successfully aimed at, and the upholstering and decoration are tasteful and artistic. The Port Morant is the pioneer of the new Imperial West Indian service, by means of which it is hoped a trade in fruit and other products will be developed to compensate the colonies for the decay of the sugar industry.

THE COLOSSAL STEEL COMBINATION.

There is nothing official as yet in the numerous reports regarding the monster steel combination, but many of them bear evidence of substantial accuracy. It is the opinion of many people who are well informed regarding the different companies involved in the negotiations that when facts are stated it will be found that the Rockefeller interest is in control. The name selected is United States Steel Co. and the constituent companies in the combination, according to reports that seem somewhat reliable, will be Carnegie Co., Federal Steel Co., National Steel Co., American Tin Plate Co., American Steel Hoop Co., American Sheet Steel Co., American Steel & Wire Co., National Tube Co., American Bridge Co., Lake Superior Consolidated Iron Mines (including Duluth, Mesabi & Northern Railway), and Bessemer Steamship Co. It is not intended that the constituent companies shall lose their identity. The plan to be adopted will be similar to that followed when the Federal Steel Co. was formed. That company took over the stocks of the Minnesota Iron Co., the Illinois Steel Co., the Elgin, Joliet & Eastern Railway Co., the Lorain Steel Co. of Ohio, and the Lorain Steel Co. of Pennsylvania, issuing its own stock in exchange. Each of the companies is operated under its own charter and organization, the revenues of the Federal Steel Co. being derived from the earnings of the constituent companies above operating expenses. According to one report the stock of the new company will be \$400,000,000, 7 per cent. preferred and \$400,000,000 common. The company will issue \$300,000,000 first mortgage 5 per cent. bonds and exchange \$160,000,000 of the bonds for \$160,000,000 of the bonds of the Carnegie Steel Co. Andrew Carnegie is to get \$124,500,000 of the remaining \$140,000,000 for his \$83,000,000 of Carnegie Co. stock. Mr. Carnegie's total holdings of the new bonds will be therefore \$207,500,000, yielding a yearly income of \$10,375,000, and he will get no stock in the new company. The minority stockholders of the Carnegie Co. will get 150 per cent. for their stock holdings in preferred stock of the new company and a bonus of an equal amount of common stock of the new company. This will take \$105,500,000 of each, preferred and common, leaving \$294,500,000 of each to be divided among the other organizations entering into the combination. These other companies have a present outstanding capitalization of \$252,085,900 preferred stock and \$274,984,000 common stock.

REGULATIONS FOR RIVER NAVIGATION.

The treasury department has just issued revised rules and regulations governing the movement and anchorage of vessels in the St. Mary's river. The revision is unimportant. It will be remembered that at the annual meeting of the Lake Carriers' Association in Detroit in January several important changes were proposed in the Sault river rules, and it was also proposed to have these rules apply to the St. Clair and Detroit rivers. These propositions were rejected, but it was decided to ask the treasury department to provide from the revenue cutter service a patrol boat to enforce regulations that now apply to the St. Clair and Detroit rivers. Capt. Geo. P. McKay and Secretary C. H. Keep of the Lake Carriers' Association will be in Washington in a few days and it is understood they will direct the attention of the secretary of the treasury to the request for a Detroit and St. Clair river patrol boat. The one change of importance in the Sault river regulations is in rule 1, which now reads as follows:

"The speed limit shall commence at Everen's point for vessels ascending the river and end at Everen's point for vessels descending the river. No steamer navigating the St. Mary's river, either ascending or descending, shall pass any other steamer or steamers moving either in the same or opposite direction in such a position that more than two steamers shall be abreast of each other when passing. In case three steamers are liable to pass in such a position that more than two steamers will be abreast in passing, the overtaking steamer shall slow down sufficiently at quarter of a mile distance to avoid passing in such position."

Mr. J. L. Greatsinger of Chicago, president of the Minnesota Iron Co., announces that W. W. Watson, Jr., of Chicago has been elected secretary of the company, to succeed L. T. Beecher, resigned. F. H. White of Duluth has been appointed assistant purchasing agent, succeeding Mr. Watson, and the purchasing department of the Minnesota company, and of its affiliated companies, the Chandler, Auburn, Elba, Fayal and Genoa iron companies, is transferred from the Chicago office to the Duluth office of the company.

The new Furness liners built by Alex. Stephen & Sons, Linthouse, Govan, to carry passengers and cargo between London, Halifax and St. John, N. B., are very handsome vessels, with yacht-like clipper bows. The Evangeline and Loyalist are 385 ft. long, 45 ft. beam and 30 ft. 6 in. deep, with a dead weight capacity of 5,000 tons and a speed of 14 knots. The engines have cylinders of 28, 46 and 75 in. by 51 in. stroke. Steam is supplied by four Scotch boilers at 180 lbs. pressure.

Compagnie des Chemins de fer de l'Ouest

(French Western Railway Company)



Number of Nautical Leagues* run yearly by
Mail Steamers fitted with
Belleville Boilers, plying between **Dieppe and New Haven**,
since their adoption in the service.

YEAR	TAMISE		MANCHE		CAEN		FRANCE	
	Number of Voyages	Nautical Leagues Run	Number of Voyages	Nautical Leagues Run	Number of Voyages	Nautical Leagues Run	Number of Voyages	Nautical Leagues Run
1893	4	87	“	“	“	“	“	“
1894	191	4,138	“	“	“	“	“	“
1895	202	4,377	“	“	“	“	“	“
1896	244	5,287	“	“	“	“	“	“
1897	149	3,222	138	2,990	“	“	“	“
1898	190	4,117	260	5,633	12	260	“	“
1899	158	3,429	204	4,420	212	4,593	28	607
1900 ⁽¹⁾	102	2,210	7	1,560	101	2,188	63	1,365
TOTALS, . .	1,240	26,867	674	14,603	325	7,041	91	1,972

(1) The distances indicated for the Year 1900 are calculated from January 1 to July 31, only.

* 1 nautical league = 3 nautical miles.

Total Horse-power of Sea-going Ships

FITTED OR TO BE FITTED WITH

Belleville Boilers.

	Number of Ships.	Total Horse-power.
<i>French Navy</i>	40	371,320
<i>The Messageries Maritimes Co.</i>	14	87,600
<i>French Western Railway Co.</i>	7	17,900
<i>English Navy</i>	65	1,046,400
<i>Russian Navy</i>	31	251,300
<i>Japanese Navy</i>	10	122,700
<i>Austrian Navy</i>	5	56,700
<i>Chilian Navy</i>	4	26,500
<i>Argentine Navy</i>	1	13,000
<i>Italian Navy</i>	2	32,500
<i>Spanish Navy</i>	1	11,000
	180	2,036,920

In addition to the above Ocean Steamships, Belleville Boilers have been fitted to a large extent on small craft, such as steam boats and launches, tugs, Fisheries guard-boats, steam yachts, dredgers, etc.; also a great number have been supplied to the French and Foreign Navies for auxiliary services.

IMPROVEMENTS IN STEAMER CITY OF RACINE.

Contracts have been let and the work is now under way for extensive alterations and improvements on the steamer City of Racine for the Chicago and Milwaukee daily service of the Goodrich Transportation Co. The designs and general arrangement plans have been prepared by Mr. W. J. Wood at the drawing office of the Goodrich company, and much of the new work will be executed at their shops in Manitowoc. The contract for the thirty-six new upper state rooms has been placed with the Manitowoc Building Supply Co. The principal dimensions of the City of Racine are: Length on keel, 203 ft. 4 in.; length, over all, 217 ft. 8 in.; beam, molded, 34 ft. 4 in.; breadth to bulwarks, 39 ft. 4 in.; depth of hold, 13 ft. 4 in.; depth, molded, 14 ft.; depth from top of keel to saloon deck, 23 ft.; mean draught of water, loaded, 11 ft.; tonnage, gross, 1,041; net, 801. Capacity for passengers in berths, 224; excursion permit, 1,000.

The overhauling will change the main and saloon deck arrangements, as well as alter the promenade deck entirely, as can be seen by a glance at the outboard profile. On the main deck in social hall the purser's office will be enlarged and a bedroom erected adjoining it. There will also be an increase made in the package room capacity, and the main stairway leading from social hall to saloon deck will be made 2 ft. wider and with an easier grade to accommodate the increased traffic expected by the additions just noted.

On the saloon deck a couple of large rooms are added at the after end and a wide easy stairway to reach the promenade deck above, which is a favorite resort for passengers who are fond of fresh air and exercise. The main stairway is amidships and there are two stairways forward at the bow. This is a very convenient and safe arrangement. The passengers can go right along continuously, up and down, back and forward or round about the vessel in a continuous promenade. On the forward end of this saloon deck the pantry is increased in size and an addition of a

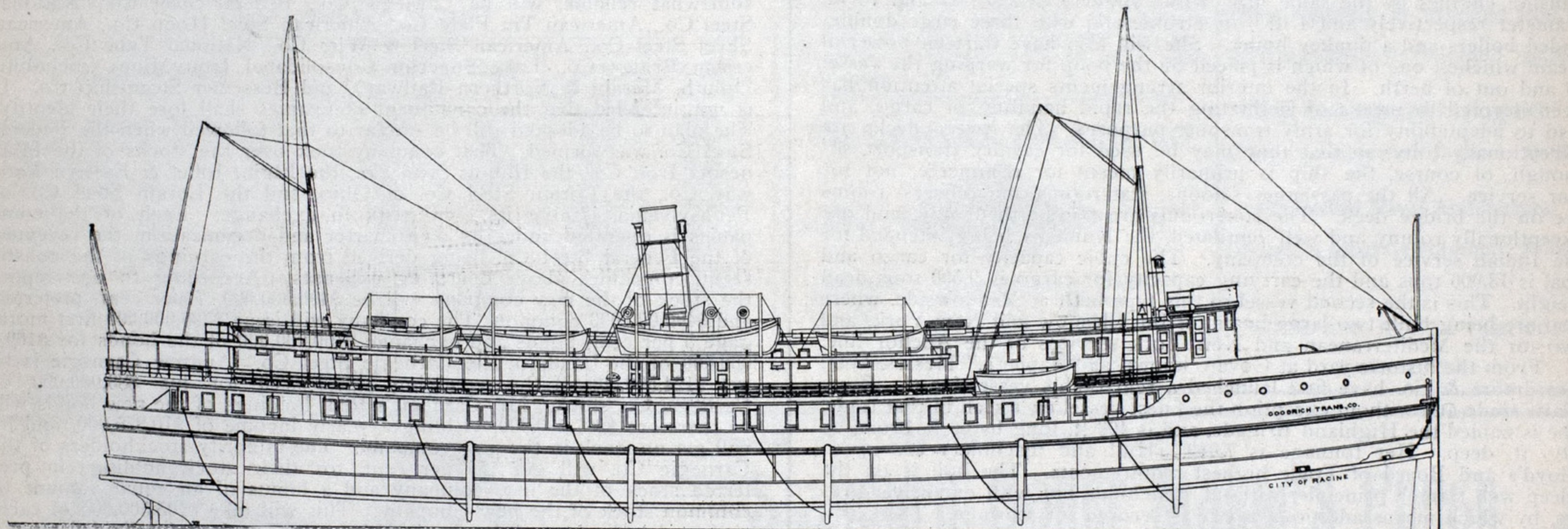
are H. W. Thorp, general manager; Capt. D. M. Cochrane, superintendent; R. C. Davis, general passenger agent, and W. S. Willard, general freight agent.

QUADRUPLE ENGINES AND WATER TUBE BOILERS.

Editor Marine Review: Quite by accident I came across a copy of the ship building edition of your paper a few days since and was much interested in the report of the new ships being built in the various ship yards on the great lakes. Having been connected with engineering matters all my life, though not in the line of marine engineering, I was more particularly interested in the machinery equipment. I noted with some surprise that in the whole list of over sixty vessels only nine are to be supplied with water tube boilers. Of these, five are for passenger trade. I have been given to understand that the days of the so-called Scotch boiler were about over in lake shipping and that the water tube boiler had driven it from the field. But your statement does not seem to bear this out.

I note also with even greater surprise that only six vessels in the list are to have quadruple expansion engines. I remember within a year or two reading more or less about the strides being made on the lakes in the adoption of quadruple engines and water tube boilers, and that the lake builders and owners were leading the world with their progressive ideas. Have they proved a failure wholly or in part, or what is the trouble?

I hope you or some of your readers can give some information on this subject. It is one of interest to every engineer, whether directly associated with ship building or not. I remember hearing at an engineering society gathering some three or four years ago the statement made by a visiting engineer connected with an eastern ship building concern that the attempt to introduce the quadruple engine on the lakes would not



CITY OF RACINE.

mess room and better wash room. The petty officers' quarters, which include mates, wheelmen, lookouts and watchmen, are comfortably located right in the bows forward of pantry. The dining saloon is on the forward end of this deck and has a capacity for seventy persons at one sitting. The after end is the ladies' cabin, furnished with piano, large easy chairs and lounges beautifully upholstered with a pretty small flower pattern of moquet on a navy blue ground. The two rooms at after end are fitted for four cabin maids, two of whom are always on watch. On this deck are also ladies' toilet rooms, linen and other lockers. The saloon throughout will be brilliantly lighted by incandescent lamps of thirty-two candle power, in clusters at close intervals, and with wall bracket fixtures.

On the promenade deck are thirty-six new staterooms for seventy-eight passengers. Several of the after rooms are larger than usual and there are two parlors amidships which are 14 ft. long by 7½ ft. wide, finished in birch, with piano finish and fitted with Pullman berths. There are toilet rooms for men and women on this deck, and ice water drinking fountains judiciously placed so that they can be reached conveniently from any seat without going too far when the boat is crowded. The light ventilation, heating, plumbing and sanitary arrangement of all the staterooms will be as perfect as the best system can make it. All the rooms will be supplied with white enameled iron wash stands, with an unlimited supply of pure running water, and the floors will be covered with wood carpet, over which loose rugs will be thrown, that can be removed, brushed and cleaned every trip. The hallways, extending fore and aft, 61 ft. and 51 ft. respectively, are as wide as in any modern hotel, and will be covered with oak carpet. There are the usual cozy corners found on all the Goodrich boats, with writing desks supplied with writing material.

One other radical change on the City of Racine will be the erection on steel beams of a boat's platform deck from a short distance abaft the captain's bridge right aft to stern. This deck, while carrying the boats aloft and out of the way, will also serve as a splendid shelter for the passengers from sun or rain, which will be much better than the loose canvas awning formerly used. There will be ten boats carried on the platform and four large life rafts on top of houses, providing capacity for 342 adults. The upper tier of staterooms will be covered with an awning in summer, which will make them delightfully cool and very desirable rooms.

At the annual meeting of the Goodrich company held in Milwaukee last week the following officers were elected: A. W. Goodrich, president; E. L. Upton, vice president; F. C. Reynolds, secretary at Milwaukee; H. W. Thorp, assistant secretary, Chicago, and W. J. Louderbach, treasurer, Chicago. The regular executives of the Goodrich Transportation Co.

prove entirely satisfactory. They were, as I remember it, just coming into use then, and he gave reasons for his belief, which, of course, did not impress me very greatly at the time, but I do remember his saying that the best commercial economy would probably be had with good triple engines and some form of mechanical draft and stoking. Your statistics seem to bear out part, at least, of his position. I shall watch your paper for further information, and I beg leave to remain, yours very truly,

Chicago, Feb. 18, 1901.

LANDSMAN.

CANADIAN MARINE INSURANCE.

Gustave Beutelspacher, commercial agent, writing to the state department from Moncton, says:

"According to the Montreal Star, Montreal will next season have a new insurance company, which will obviate the necessity of vessels leaving the port of Montreal without any insurance upon them. The name of the new insurance company is the St. Lawrence Lloyds, and its aim is to carry on an ocean and inland marine insurance business, with the right to maintain and navigate ice-breaking and wreck-relieving steamers on the St. Lawrence river. The company proposes to insure Canadian shipping at lower rates than those at present prevailing, so as to enable all vessels leaving the port in the fall to get insured. Several of the vessels which left Montreal late last fall had to proceed to sea without any insurance, as the underwriters would not take the risk. The company will maintain a fleet of ice-breaking steamers, to enable their insured vessels to more safely leave the port in the autumn. These will probably be on the lines of the Duluth ice boats of the Inman type, whose owner was in Montreal some weeks ago. The new company will be ready for business next season. The formation of this Canadian Lloyds is the most important step taken for many years in the building up of the St. Lawrence route, as it will tend to destroy the present high rates imposed by the English companies. The capital of the company is \$5,000,000."

The ship building firm of Arthur Sewall & Co. of Bath, Me., which closed the last century with the launch of their hundredth ship since 1828, has stretched the keel of their first ship for this century. In recognition of Senator Frye's conspicuous services to the American merchant marine, this vessel, a four-masted steel ship of the largest size, will be named William P. Frye. Senator Frye has accepted the compliment, and the ship will probably be launched in October.

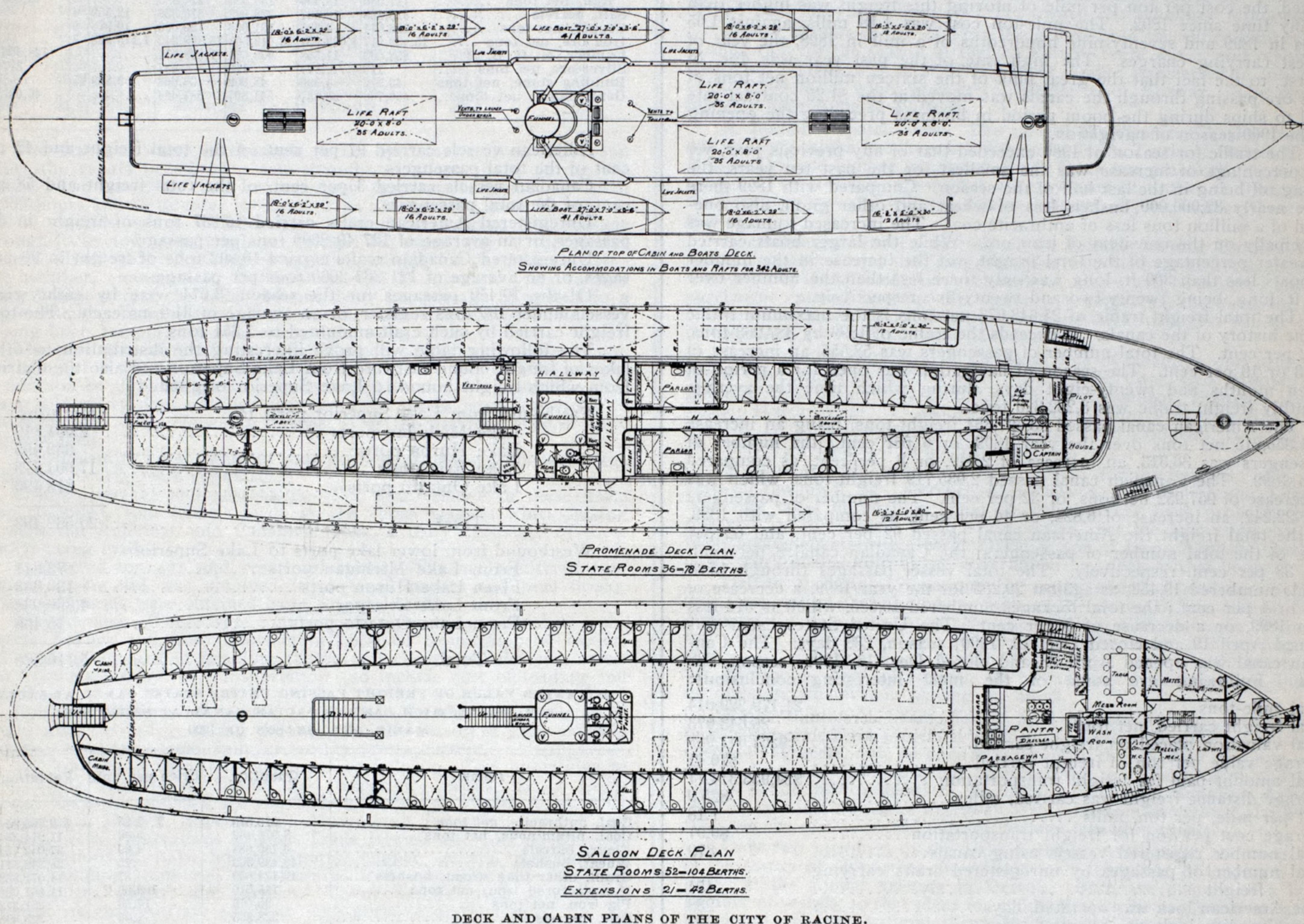
STORM FORECAST FOR NORTH ATLANTIC OCEAN.

Mr. Willis L. Moore, chief of the weather bureau, reported on Aug. 28 last year that it was expected soon to introduce an important innovation in the work of the bureau. The bureau in the near future would make special storm forecasts for the North Atlantic ocean. It would be possible to take this step as soon as weather reports were regularly received from the Azores and Bermuda in addition to those from the Bahamas and the West Indies.

The service has now been established and will be of advantage to transoceanic and coastwise commerce besides providing data for more accurate forecasts of the weather in our country. The largest element of weakness in weather predictions has been that they are made with little reference to conditions at sea. Fair weather, for example, has often been predicted in ignorance of the fact that an area of high barometric pressure in the Atlantic was already sending storm laden winds to our coasts. A part of the North Atlantic from our shores to Africa and southern Europe is known as an area of high pressure. This region is larger than the United States and it is important to obtain all possible knowledge of the conditions in it in order to perfect weather predictions relating to our land surface. This is so because the development of West Indian hurricanes, the direction of the paths they take, the intensity and duration of the hot waves that sweep over the country and to some extent

Thus reports will be received from points extending far north and south clear across the Atlantic, from which it is expected to deduce approximate weather conditions as they exist over the ocean; and these conditions being known it will be possible to predict the direction which storms originating in the United States or in Europe will take after they get out to sea. This information will be of great value to vessels about to leave port. The weather bureau has already begun to issue to the captains of the transatlantic liners predictions of the weather for three days out of New York. It is not yet possible every day to make a satisfactory forecast, but whenever the essential data are received the weather bureau is supplying a forecast of the wind force and wind direction for the first three days of the route of all outgoing steamers from this country; and also for an equal period for such steamers as place themselves in communication with the bureau before leaving European ports. This result has long been desired, both by the meteorologists and the mariners.

This extension of the forecast service is the outcome of study given to the meteorology of the whole northern hemisphere since 1873. The result of this study has been to advance our knowledge of the laws governing weather conditions and of the practical application of these laws in the interest of the farmer and the mariner. It is hoped that in future the farmer may receive more reliable predictions than ever before; and that the mariner will benefit in large measure by news brought to him of weather conditions at sea and by predictions based upon this information.



the movement of the cold waves, are believed to depend upon the position of this area of high pressure out at sea.

New stations have just been established on Atlantic islands to improve the advantage offered by the new cable lines for obtaining daily record of the weather conditions on the ocean. In January Prof. Alfred J. Henry established a meteorological station at Hamilton, Bermuda, about 1,000 miles east of North Carolina. The weather bureau has now a chain of stations extending through the West Indies and the Bahamas to Bermuda. The western part of the ocean is thus covered from the northern coast of South America to Bermuda. Hamilton, the capital of the Bermudas, has cable connections with Halifax, and it will now be possible to forecast with greater accuracy the tracks of the storms which sometimes develop much intensity in the Atlantic and burst with fury upon our South Atlantic coasts. Bermuda is also in the track of the atmospheric disturbances which pass northeastward from the Florida coast, but sometimes recurve to the northwest, striking the coasts of southern New England. By combining reports from the chain of stations through the West Indies to Bermuda with those relating to atmospheric movements over the land it is reasonably expected that a part of the element of uncertainty in weather prediction will be eliminated.

But it is also important to mariners starting for sea, and likewise to our land weather service, to know the prevailing conditions east of the Bermudas. For this reason the weather bureau has arranged with Capt. F. A. Chaves, director of the meteorological observatory at St. Michaels, Azores, to report daily the weather conditions in that part of the Atlantic. These reports will be collated with the daily telegrams received from London summarizing the conditions west of Spain, France and Ireland.

PASSENGER STEAMER TO HAVE STEAM TURBINES.

Messrs. Denny Bros., Dumbarton, Scotland, are to build for Capt. John Williamson of Glasgow, a large, speedy and handsomely-appointed passenger vessel, to be propelled by steam turbine machinery of the Parsons' type. This unique vessel will have a water line length of 250 ft., a beam of 30 ft. and a molded depth at side of 11 ft. Her designed draught is 6 ft. 6 in. loaded, and at this draught turbine machinery of 4,000 H.P. is expected to give her a speed of 20 knots per hour. The machinery will operate in three shifts, there being two 3-ft. wheels on each side shift and one 4-ft. wheel on the center shift. The steamer will be able to go astern at a speed of 15 knots or three-quarters of the ahead full speed. The center screw will only work when the vessel is going ahead. Steam will be supplied by two Scotch boilers. This in itself is a remarkable innovation, for few naval architects would care to adopt the steam turbine without first obtaining all the advantage of weight and space offered by the water tube boiler. The new steamer will ply with the Duchess of Hamilton on the route between Fairlie and Campbeltown, and run in connection with the Midland & Glasgow & South Western Railway Co.'s tourist arrangements. The run between the two ports named is 40 miles. The new steamer will be finished for active service this summer.

Cobb, Butler & Co., Rockland, Me., are building a four-masted schooner for Crowell & Thurlow of Boston. Dimensions: Length, 210 ft.; beam, 43 ft.; depth of hold, 25 ft. Her capacity will be 2,600 tons of coal. Capt. L. K. McKeown, formerly of the schooner Lucy A. Davis, will command the new craft.

COMMERCE OF LAKE SUPERIOR.

A VERY INTERESTING REPORT DEALING WITH ALL PHASES OF THE LAKE CARRYING TRADE—IT HAS THE STAMP OF GOVERNMENT OFFICIALS IN CHARGE OF THE ST. MARY'S FALLS CANAL.

The commerce to and from Lake Superior through the United States and Canadian canals at Sault Ste. Marie is more than half the commerce of the entire chain of great lakes, and it is therefore fortunate that officials of these canals keep reliable records of the traffic. It has often been explained in these columns that the customs regulations governing movements of vessels do not admit of the preparation of a reliable statement covering the entire volume of lake commerce; but at the canals of the Sault we have the government records, and they are very interesting.

Gen. Supt. Joseph Ripley of Sault Ste. Marie has just submitted to Col. G. J. Lydecker for transmission to the secretary of war the exhaustive report of canal commerce for 1900 that is known as the mile-ton report. This report, prepared by Clerk Frank T. McArthur and assistants during the winter period following the close of the canals, goes into all manner of details regarding the canal traffic. The report shows, for instance, that \$24,953,314 was paid as carrying charges to the vessels that moved 25,643,073 tons of freight through the canals in 1900, and that the total value of the freight itself was \$267,041,959. As might have been expected, the cost per ton per mile of moving this freight was higher than at any time since 1892. The mile-ton cost was 1.18 mills, against 1.05 mills in 1899 and seventy-nine hundredths of a mill in 1898, the year of lowest carrying charges. The high rate of the past year was due, of course, to the fact that the great bulk of the sixteen million net tons of iron ore passing through the canals was moved at the \$1.25 contract rate paid to ships during the boom period in business preceding the opening of the 1900 season of navigation.

The traffic for season of 1900 exceeded that of any previous year, yet the percentage of increase was the smallest for the past ten years, the falling off being in the last half of the season. Compared with 1899 there were nearly 32,000,000 bushels less of wheat and other grain, also one-third of a million tons less of anthracite coal. The increased tonnage was principally on the one item of iron ore. While the larger boats carried a greater percentage of the total freight, yet the increase in the number of boats less than 300 ft. long was only three less than the number over 300 ft. long, being twenty-two and twenty-five respectively.

The total freight traffic of 25,643,073 net tons is the maximum traffic in the history of the canals. It exceeds the traffic of 1899 by 387,263 tons, or 2 per cent. The total number of passengers was 58,555, an increase of 9,473 or 19 per cent. The season of navigation was open for a period of seven months and twenty-eight days, during which time the average monthly freight traffic was 3,232,320 tons.

The American canal passed 23,607,354 freight-tons, being an increase of 1,355,215 net tons over the year 1899, or 6 per cent.; the number of passengers was 36,313, an increase of 2,649, or 8 per cent. as compared with 1899. The Canadian canal passed 2,035,719 freight-tons, which was a decrease of 967,952 net tons, or 32 per cent. The number of passengers was 22,242, an increase of 6,824, or 44 per cent. as compared with 1899. Of the total freight the American canal passed 92 per cent. and 62 per cent. of the total number of passengers; the Canadian canal 8 per cent. and 38 per cent. respectively. The total vessel passages through both canals numbered 19,452, as against 20,255 for the year 1899, a decrease of 803, or 4 per cent.; the total lockages numbered 10,685, which is 314 less than 1899, or a decrease of 3 per cent. The United States canal was opened April 19 and closed Dec. 12, 1900; season, 238 days. The Canadian canal was opened April 23 and closed Dec. 16, 1900; season, 238 days. Following are some of the most interesting conclusions:

Total mile-tons	21,179,229,014
Total freight carried, net tons	25,643,073
Total valuation placed on freight carried.....	\$267,041,959
Average value per ton of freight carried.....	\$10.41
Total amount paid for freight transportation	\$24,953,314.71
Average distance freight was carried, miles.....	825.9
Cost per mile, per ton, mills	1.18
Average cost per ton for freight transportation.....	\$0.97
Total number registered vessels using canals.....	879
Total number of passages by unregistered crafts carrying freight	454
Time American lock was operated, days	238
Time Canadian lock was operated, days	238
Total valuation placed on registered vessels.....	\$69,735,159
Total number of passengers transported	58,555
Freight carried by registered vessels, tons.....	25,585,934
Freight carried by unregistered vessels, tons.....	57,139
Freight carried by American vessels, per cent.	97
Freight carried by Canadian vessels, per cent.	3
Passengers carried by American vessels, per cent.	42
Passengers carried by Canadian vessels, per cent.	58

The number of registered vessels of 400 to 500 ft. length using the canals in trade to and from Lake Superior (some of them passing every eight to ten days) was 56; of 300 to 400 ft. length, 136; of 200 to 300 ft. length, 285; of 100 to 200 ft. length, 320, and of less than 100 ft. length, 82.

The records show that 357 different vessels in a single trip of each carried a total of 1,422,175 net tons.

The maximum traffic for a single day was on June 4, when 219,364 freight tons were passed by 125 vessels, whose registered tonnage amounted to 171,707. The minimum traffic for a single day was on Dec. 15, when two freight tons were passed by four vessels, whose registered tonnage amounted to 124 tons.

The steamer Presque Isle, owned by the Cleveland Cliffs Iron Co., is credited with having moved the largest amount of freight through the canals during the season—195,550 net tons. The New York Central Railway Co.'s steamer Troy has the greatest number of miles run to her credit—45,318. The greatest number of mile-tons—154,554,378—is credited to the American Steamship Co.'s steamer John W. Gates. The Gates also carried the largest cargo moved through the canals—8,462 net tons. One of the large steel tow barges of the Minnesota Steamship Co.'s fleet, the Madeira, carried 8,206 net tons in a single load.

COMPARATIVE STATEMENT OF COMMERCE THROUGH UNITED STATES AND CANADIAN CANALS AT SAULT STE. MARIE, MICHIGAN AND ONTARIO, FOR THE SEASONS OF 1899 AND 1900:

ITEMS.	Traffic for 1900.		Total traffic for		Incr., 1900		Decr., 1900.	
	United States canal.	Canadian canal.	Season 1900.	Season 1899.	Amount.	Per cent.	Amount.	Per cent.
Vessel passages:								
Steamers, number	11,805	2,621	14,426	14,378	48	0		
Sails, number	3,701	303	4,004	4,776			772	16
Unregistered, number.....	863	159	1,022	1,101			79	7
Total passages, number	16,369	3,083	19,452	20,255			803	4
Lockages, number	8,479	2,206	10,685	10,993			314	3
Tonnage:								
Registered, net tons	20,136,782	2,179,052	22,315,834	21,958,347	357,487	2		
Freight, net tons	23,607,354	2,035,719	25,643,073	25,255,810	387,263	2		
Passengers, number	36,313	22,242	58,555	49,082	9,473	19		
Coal, hard, net tons.....	476,131	39,384	515,515	841,281			325,766	39
Coal, soft, net tons.....	3,488,558	482,904	3,971,462	3,099,606	871,856	28		
Flour, barrels	6,123,458	637,230	6,760,688	7,114,147			353,459	5
Wheat, bushels	31,325,693	9,163,609	40,489,302	58,397,335			17,908,033	31
Grain, other than wheat, bushels	15,668,245	1,106,414	17,459,659	30,000,935			13,826,276	46
Manufactured and pig iron, net tons	117,086	18,499	135,585	214,585			79,000	37
Salt, barrels	318,358	10,537	328,895	316,336	12,559	4		
Copper, net tons	126,671	4,395	131,066	120,090	10,976	9		
Iron ore, net tons	15,439,617	1,003,951	16,443,568	15,328,240	1,115,328	7		
Lumber, M. ft. B. M.	898,093	11,558	909,651	1,038,057			128,406	12
Silver ore, net tons.....	110		110	487			377	77
Building stone, net tons	43,912	4,990	48,902	39,063	9,839	25		
Genl. mdse., net tons.....	430,760	80,637	541,397	587,484			46,087	8

American vessels carried 97 per cent. of the total freight and 42 per cent. of the total passengers.

Canadian vessels carried 3 per cent. of the total freight and 58 per cent. of the total passengers.

Unregistered American crafts carried 46,237 tons of freight in 364 passages, or an average of 127 49-2000 tons per passage.

Unregistered Canadian crafts carried 10,902 tons of freight in 90 passages, or an average of 121 267-2000 tons per passage.

Of the 19,452 passages for the season, 3,674 were by eighty-eight vessels under 100 tons register, or an average of 31 tons each. The total freight carried by such craft amounted to 1,351 tons.

The following table will prove interesting the distribution to other lakes of freight bound eastward from Lake Superior and also the districts from which freight bound to Lake Superior originated:

Eastbound from Lake Superior ports to	Net tons.
Lake Michigan ports	2,054,819
Lake Huron ports	659,405
Lake Erie ports	17,604,773
Lake Ontario ports	213,496
Total	20,532,493

Westbound from lower lake ports to Lake Superior	
From Lake Michigan ports	73,841
From Lake Huron ports	130,333
From Lake Erie ports	4,890,938
From Lake Ontario ports	15,468
Total	5,110,580

ESTIMATED VALUE OF FREIGHT PASSING UNITED STATES CANAL AT SAULT STE. MARIE, MICH., AND CANADIAN CANAL AT SAULT STE. MARIE, ONT., SEASON OF 1900

Items.	Quantity.	Price per unit	Valuation.
Coal, anthracite, net tons	515,515	\$ 5.25	\$ 2,706,454
Coal, bituminous, net tons	3,971,462	3.00	11,914,386
Flour, barrels	6,760,688	4.00	27,042,752
Wheat, bushels	40,489,302	.70	28,342,511
Grain, other than wheat, bushels	16,174,659	.87	14,071,953
Manufactured iron, net tons	115,510	100.00	11,551,000
Pig iron, net tons	20,075	17.50	351,313
Salt, barrels	328,895	1.00	328,895
Copper, (refined and matte), net tons..	131,066	300.00	39,319,800
Iron ore, net tons	16,443,568	3.75	61,663,380
Lumber, M. ft. B. M.	909,651	16.50	15,009,241
Silver ore, net tons.....	110	125.00	13,750
Building stone, net tons	48,902	12.00	586,824
General merchandise, net tons.....	541,397	00.00	54,139,700
Total			\$267,041,959

Average value per ton of freight for season of 1900, \$10.41.
Average value per ton of freight for season of 1899, \$11.14.

AMOUNT PAID FOR CARRYING FREIGHT THAT PASSED THROUGH UNITED STATES CANAL AT SAULT STE. MARIE, MICH., AND CANADIAN CANAL AT SAULT STE. MARIE, ONT., SEASON OF 1900.

Articles.	Quantity.	Rate per unit.	Amount.
Coal, net tons.....	4,486,977	\$.44	\$ 1,974,269.88
Flour, barrels	6,760,688	.12	811,282.56
Wheat, bushels	40,489,302	.02	809,786.04
Grain (other than wheat), bushels.....	16,174,659	.02	323,493.18
Manufactured iron, net tons	115,510	2.00	231,020.00
Pig iron, net tons.....	20,075	1.50	30,112.50
Salt, barrels	328,895	.15	49,334.25
Copper, net tons.....	131,066	1.60	209,705.60
Iron ore, net tons.....	16,443,568	1.05	17,265,746.40
Lumber, M. ft. B. M.	909,651	2.30	2,092,197.30
Silver ore, net tons.....	110	2.00	220.00
Building stone, net tons.....	48,902	1.50	73,353.00
General merchandise, net tons.....	541,397	2.00	1,082,794.00
Total			\$24,953,314.71

In connection with the foregoing table there is also the following summary of relative values of the different commodities passing through the canals:

	Per cent.
Iron ore, manufactured and pig iron	27.6
Cereals—wheat, rye, oats, corn, barley, flax and flour.....	26.0
Copper	14.7
Lumber	5.6
Coal, anthracite and bituminous	5.5
All other products	20.6

TABLE SHOWING TOTAL FREIGHT, ITS VALUATION, COST OF TRANSPORTATION, AVERAGE LENGTH OF TRIPS AND RATE PER TON PER MILE FOR SEASONS INDICATED.

Year.	Total freight.	Valuation of freight.	Total cost of transportation.	Average distance freight was carried.	Cost of transportation per mile-ton.
	Net tons.			Miles.	Mills.
1887	5,494,649	\$ 79,031,757	\$10,075,153.13	811.4	2.3
1888	6,411,423	82,156,019	7,883,077.40	806.4	1.5
1889	7,516,022	83,732,527	8,634,246.63	790.4	1.5
1890	9,041,213	102,214,948	9,472,214.90	797.2	1.3
1891	8,888,759	128,178,208	9,849,022.81	820.4	1.35
1892	11,214,333	135,117,267	12,072,850.88	822.4	1.31
1893	10,796,572	145,436,957	9,957,483.11	831.9	1.1
1894	13,195,860	143,114,502	10,798,310.28	821.1	.99
1895	15,062,580	159,575,129	14,238,758.02	830	1.14
1896	16,239,061	195,146,842	13,511,615.80	836.4	.99
1897	18,982,755	218,235,927	13,220,099.84	841.3	.83
1898	21,234,664	233,069,740	14,125,896.00	842.6	.79
1899	25,255,810	281,364,750	21,959,707.25	827.2	1.05
1900	25,643,073	267,041,959	24,953,314.71	825.9	1.18

The depth of water in channels of the St. Mary's river above and below the canals permitted a safe draught of about 18 ft. during the season. The American canal records show that vessels necessarily spent 19,366 hours and 33 minutes in canal, or an average of 1 hour 10 minutes and 59 seconds, which includes time waiting for lockage and passage through locks and canal, the latter being 1 3-5 miles long. Other delays at canal which included taking on supplies, waiting for daylight or favorable weather, amounted to 16,298 hours and 31 minutes. The railway swing bridge across the canal did not delay the passage of vessels in a single instance, but the total delay to trains amounted to 56 minutes by passing boats temporarily preventing the closing of the bridge.

The canal postoffice delivered 104,587 pieces of mail during the season, consisting of 93,689 letters, 5,406 postals, 4,898 newspapers and 594 parcels. In addition to this, 674 pieces were returned to the city postoffice after being held thirty days uncalled for, and 2,052 pieces were forwarded to new addresses. This shows an increase over the previous year of 7,209 pieces of mail.

The following notes relate to sources of information from which the foregoing records were compiled:

Freight tonnage and passengers.—The data relative to these items were compiled from reports made by the vessel masters when passing through the American and Canadian locks, a daily exchange of these reports being made.

Registered tonnage and vessel valuations.—The net registered tonnage is given and was obtained from vessel papers and blue books. Vessel valuations were obtained from Inland Lloyd's.

Freight rates.—These were compiled from quotations published in the Marine Review and from information obtained from shippers, owners and carriers engaged in handling the several classes of lake commerce. The freight rates are for transportation and include cost of loading and unloading.

Freight valuations.—The unit values used for the various items of freight were derived by taking the mean for the season of each monthly average as obtained from daily or weekly prices current.

The sources of valuations given are as follows: Coal quotations in Coal Trade Journal at Duluth and Superior; cereals, Daily Commercial Record, published by the Duluth Board of Trade; flour, daily quotations in Duluth, Superior and Minneapolis journals; iron ore and pig iron, weekly quotations in Iron Trade Review and Marine Review; salt, quotations at Lake Superior ports; copper, general merchandise, lumber, building stone and manufactured iron, quotations by the principal shippers, owners and carriers. To quotations given at point of shipment freight rates are added to lake ports of destination.

SALES OF BULLOCK ELECTRIC MFG. CO.

Following are sales that have been entered by the Bullock Electric Mfg. Co., Cincinnati, in one week recently: Joseph Joseph, Cincinnati, one 50 K. W. engine type generator; Manning, Maxwell & Moore, New York, one 180 K. W. engine type generator, one 35, one 50 and one 65 H. P. motors; Pittsburg Engineering Co., Pittsburg, Pa., one 30 K. W. engine type; American Sugar Refining Co., New York, one 50 H. P. motor; John L. Thompson, East Baltimore, one 100 K. W. engine type generator; New Schuyler Apartments, one 50 K. W. and one 25 K. W. engine type generators; Fore River Engine Co., Quincy, Mass., fourteen motors of miscellaneous sizes, making about forty Bullock motors in all which this company has purchased; United States Finishing Co., Greenwich, Conn., one 75 H. P. motor; Mosler Safe Co., Hamilton, O., one 35 H. P. motor; Pacific Coast Borax Co., Bayonne, N. J., one 15 H. P. motor, making about twenty Bullock motors now in operation by this company; Wolf Process Lea. Co., Summerdale, Pa.; one machine, 80 K. W. engine type; Jacob Ruppert, New York, two machines, sixty K. W. generators, engine type, and switch board, together with several small motors; National Enameling & Stamping Co., Baltimore, one 65 H. P. motor; Christian College, Columbia, Mo., one 17½ K. W. engine type generator; Berghel & Young, London, Eng., one 225 K. W. type "H" generator and two 60 H. P. teaser equipments for operating newspaper press; Brown Hoisting Machinery Co., Cleveland, one 25 H. P. motor; Columbia Chemical Co., Barborton, O., one 42½ K. W. engine type generator. The Bullock company has just issued bulletin No. 38, describing their electric locomotive and crane car. This bulletin may be obtained by addressing the company.

AROUND THE GREAT LAKES.

Capt. H. Warwick, representing Howard H. Baker & Co., ship chandlers of Buffalo, was in Cleveland during the week on his way back to Buffalo after a trip throughout the lake region.

Credit should have been given to the Buffalo Express for an article in the last issue of the Review by Lieut. Com. J. H. Bull of the navy on "Charts of the Great Lakes."

Mr. Charles E. Wheeler, manager of the Cleveland Steel Canal Boat Co., has chartered the steamer Mary H. Boyce from Monroe & Boyce of Grand Haven for service between Cleveland and Buffalo during the coming season.

The Toronto, Buffalo & Montreal Steamboat Co., Limited, has been incorporated with a share capital of \$100,000. The provisional directors are Judge Morgan, John A. Carlaw, H. W. VanEvery, T. P. Coffee and Dr. W. T. Stewart, all of Toronto.

Argo is the name selected for the steel freight and passenger steamer building at the Craig works, Toledo, for the A. Booth Packing Co. This vessel is for Duluth-Port Arthur-Isle Royale service and will cost complete about \$125,000.

Capt. Charles W. Norton, well known vessel agent of Detroit, died in Grace hospital in that city on Monday. He was fifty-three years of age. He began life as a marine reporter and marine artist but gradually drifted into the vessel business. He owned the schooner Monguagon.

Moore, Kipple & Co. of Port Wing have sold the entire lumber cut of their mill for the season of 1901 to Potter, Teare & Co. and others of Cleveland. There will be 18,000,000 ft. of lumber transferred in this deal—16,500,000 ft. of white pine and 1,500,000 ft. of Norway. The money involved approximates \$270,000.

A Buffalo dispatch says: The sale of the steamer Charles Hebard and consorts Aloha and Annabel Wilson by H. A. Tuttle of Duluth to the Nelson Holland lumber interest at Black Rock has practically been concluded. The Holland interest has a heavy tract of timber at Byng Inlet on Georgian bay and will cut a large amount of pine lumber there this season.

A conference between officials of the recently-formed Lumber Carriers' Association and the longshoremen will be held at Ashland next Tuesday. It is expected that a schedule of wages will be adopted and an agreement entered into for the season. A conference between the ore and coal handlers at Lake Erie ports and the dock managers will be held in Cleveland a week from next Monday.

Captains and engineers of the Sault line of steamers operating between Gladstone and Buffalo are: Minneapolis, Capt. Geo. Moore, Engineer D. J. McMillan; St. Paul, Capt. Peter Thompson, Engineer Henry Stone; Huron, Capt. W. Moore, Engineer Clinton Folkerts; Hennepin, Capt. C. D. Ross, Engineer Samuel Moore; John Pridgeon, Jr., Capt. D. N. Sherwood, Engineer John Morgan.

Plans of the American Ship Building Co. for the purchase of a ship yard on the lower St. Lawrence where new vessels sent to the Atlantic from the lakes in sections could be put together have probably been dropped for the present as it is announced that the lake company has made arrangements with George Davie & Son of Levis, opposite Quebec, to do work of this kind in the government dry dock at that point.

Detroit & Buffalo Steamboat Co. is the name selected for the Detroit corporation that is to have built at the works of the Detroit Ship Building Co. two very large side-wheel freight and passenger steamers for service between Detroit and Buffalo. The work of financing the scheme is being conducted by Mr. A. McVittie and his able lieutenant, Mr. Merton E. Farr, of Detroit. It is understood that they are finding no difficulty whatever in placing the stock.

Major Clinton B. Sears, having been ordered to Guam and Manila to superintend certain projected engineering works, Capt. David Gaillard, corps of engineers, now on duty as assistant to the engineer commissioner of the district of Columbia, has been ordered to Duluth, Minn., to take charge of the improvements of the harbors of Duluth, Superior, Ashland and Grand Marais and the waterway across Keweenaw point, Lake Superior, and the operation and care of Portage lake ship-canal.

Only two members of the Lake Carriers' Association are undecided in the matter of supporting the scheme for a federation of employes proposed at the annual meeting in Detroit. Both are owners of a large number of vessels, so that plans for completion of the organization cannot go along very well without them, but it is still thought they will give consent to the scheme in time to have it in operation by the opening of navigation.

At the annual meeting of the Canada-Atlantic Transit Co., held in Duluth last week, the following directors and officers were re-elected: John R. Booth of Ottawa, president; Hiram F. Stevens of St. Paul, vice-president; James T. Rose of Duluth, secretary; W. H. Burk of St. Paul, treasurer; E. J. Chamberlain of Ottawa, general manager; James T. Rose of Duluth, Harry L. Moore of Minneapolis, W. H. Burk, W. R. Sache and H. F. Stevens of St. Paul, directors. There is building at Toronto for this company's service a duplicate of the steel package freight steamer Ottawa.

According to the present program the steamer Northwestern, first of the four Counselman steamers building at Chicago (a description will be found elsewhere in this issue), will leave Chicago for Hamburg April 25. The following day a sister ship will leave with a cargo for Liverpool. On May 1 and 4 the Northeastern and Northtown will leave for Hamburg and Liverpool respectively. Eighteen days will be consumed in the passage through the lakes, St. Lawrence river, Gulf of St. Lawrence and across the Atlantic. Although more than two months intervene before the first of these vessels leave the Chicago wharf, the Northwestern Steamship Co. is in daily receipt of applications for space aboard, and a number have been rejected because of the character of the cargo. Large consignments of flour, lard, meats, agricultural implements, lumber, logs, copper and copper ore have been already arranged. The promoters of the new line figure that they can land Chicago merchandise in London or Liverpool as quickly by this route as can be done by the old route, by rail to New York and thence by water to their destination. The first two steamers will not leave the hands of the builders until April 15.

RETIREMENT OF REAR ADMIRAL HICHBORN.

A SKETCH OF HIS CAREER AND OF HIS SERVICES TO THE UNITED STATES NAVY—THE WONDERFUL REVOLUTION WHICH HAS TAKEN PLACE IN HIS TIME.

Rear Admiral Philip Hichborn, chief constructor of the navy, will retire under the age limit on March 4. Therefore, it will not be amiss to review his career. The life of no man has encompassed so much in naval affairs. When he entered the service the frigate was the fighting ship. He has seen and has participated in the wonderful revolution from sail to steam and from wood to steel. Philip Hichborn first saw the light of day at Charlestown, Mass., he being the second son born to Philip Hichborn, a highly respected citizen of Boston and vicinity. Young Hichborn was educated in the public schools of Boston, and with the former senator from Florida, the Hon. Samuel Pasco, now serving as one of the interoceanic canal commissioners, graduated from the high school of that city, they being the only boys in the graduating class. For a few months after finishing school, he acted as assistant secretary to Admiral F. H. Gregory, the commandant of the Boston navy yard, and then became indentured to the government as shipwright apprentice in the same yard, under the tuition of Melvin Simmons, master shipwright. During this five years of apprenticeship, his great desire to advance and to satisfy a thirst for all knowledge available, caused him to enter the night class at French's mercantile agency, from which he graduated in 1859, receiving as a reward for close application to study and distinguished scholarship, a gold broad-ax, the emblem of the trade he had selected to follow. After receiving his certificate of apprenticeship, and in recognition of his merit, the secretary of the navy, Isaac Toucy, upon recommendation of Admiral Gregory, ordered that Hichborn receive a course of theoretical training in ship design and calculations, and for the next two years while in charge of Prof. Molle, he attained a degree of proficiency rarely exceeded by one so young.

APPOINTED AS ASSISTANT NAVAL CONSTRUCTOR.

A mutual desire to be associated with each other led Mr. Hichborn from the Atlantic to the Pacific coast, where his former instructor, Melvin Simmons, having been appointed a naval constructor, was stationed. In August, 1861, having obtained a position as carpenter of the clipper ship *Dashing Wave*, he set sail from Boston for the Golden Gate. This tedious and tempestuous voyage of 150 days, forty of which was spent in rounding Cape Horn, gave him the experience in which he was lacking, and which proved so valuable in later years. Upon arrival in San Francisco he was engaged, the short time previous to again entering into the employ of the government, with the Pacific Mail and the California Steam Navigation Cos. Entering the navy yard, Mare Island, as a journeyman shipwright, his practical and technical training, combined with natural aptness, made his advancement simply a question of time and opportunity. Promotion came rapidly; a vacancy occurring in the position of timber inspector was the first step in his advancement, then to draftsman, quartermaster, shipwright, and on Sept. 30, 1862, to the very responsible position of master shipwright. There are but few instances on record where a young man but twenty-three years of age is entrusted with such a responsible position, often involving the direction of over 1,000 men, and work aggregating thousands of dollars. The naval constructor being absent on leave, his first duty as master shipwright was the hauling out and rebuilding of the United States steamer *Saginaw*. Thus, for the time being, he was required to perform the arduous duties of master shipwright and naval constructor. The navy of this period was on the lookout for just such men as Hichborn, and recognizing his ability, tendered to him the appointment of assistant naval constructor, which at that time he declined because his salary as master shipwright exceeded that of the appointment tendered. In 1869, however, seeing the advantage of entering the service, he applied for the appointment which five years previous he had rejected, and in May of the same year passed a severe examination and was duly appointed on June 26, 1869, an assistant naval constructor of the United States navy, with the rank of lieutenant. Gold braid and uniform, which often ruins a young man's efficiency and alienates him from his former associates, had no effect upon Philip Hichborn; it was the internal and not the external that made him a man, so that when, in 1870, after ten years' life on the Pacific coast, he was detached from duty at Mare Island, and ordered to report at Portsmouth navy yard, New Hampshire, the whole city of Vallejo arose en masse, to tender to this popular young officer a farewell reception before his departure for the east. The day of his departure was a gala one in that city, the Vallejo fire department, of which he had been elected successively for a number of years, chief engineer, turned out in force; the workmen in the yard took a holiday, and, together with a large number of citizens, joined the procession that escorted him to the railroad station, and gave him a send-off long to be remembered.

In Portsmouth navy yard, during the building of the *Marion*, *Enterprise* and *Essex*, the latter ship coming directly under the supervision of Mr. Hichborn, and the repairing of many other ships of the navy, an experience was gained that afterwards bore abundant fruit. In July, 1875, after passing a competitive examination at New York navy yard, in which he distanced all his competitors, he received his commission as a naval constructor, mark No. 1.

AN EXAMPLE OF HIS DEVOTION TO DUTY.

One instance of the fact that he would never send a man to do work that was considered too dangerous for himself occurred in 1875, when the *Ticonderoga* arrived at the navy yard with several cases of yellow fever on board. Under orders from the department, Naval Constructor Hichborn submitted the vessel to a thorough cleansing process to destroy all germs of disease. This work he superintended personally, and as a result was taken ill and confined to his room for several months. In December, 1875, he reported for duty at Philadelphia, and assisted very materially in straightening out the confusion incident to moving the tools, material, etc., from the old yard to that of the new then located at League Island. At this time he also superintended the rebuilding and fitting out of the old *Constitution*, which was to carry goods to the Paris exposition. By special invitation, he took an active part in the ceremonies of the Centennial exposition, held in Philadelphia the following year.

In 1880, when congress awoke from its lethargy, determined to reorganize the navy and no longer be the laughing stock of the world, Naval Constructor Hichborn was selected by Secretary Hunt to serve as a member of the first naval advisory board. In addition to this and his regular duties at the navy yard he had in charge the superintendence of construction and completion of the monitors *Terror*, *Amphitrite* and *Puritan*, and it is due to him that two of these vessels were converted from double-turreted monitors of doubtful utility into double barbette-turreted coast defense vessels of a very formidable type. These highly efficient barbette turrets, familiarly styled "Hichborn turrets," were unanimously approved by the board of bureau chiefs, and have since been improved and perfected and become a part of the construction of every turreted vessel of the navy.

HIS SERVICES AS AN INVENTOR.

In 1884, the need of an expert to go abroad and investigate naval progress in Europe, resulted in the selection by Secretary Chandler of Naval Constructor Hichborn, his knowledge and experience eminently fitting him for that duty. How well he acquitted himself of this task, and the value of his report on European dock yards, is attested by the two editions congress found necessary to authorize. On his return from Europe he was detached from duty at the navy yard, League Island, and ordered to the navy department, Washington, D. C., as assistant chief of the bureau of construction and repair, and concurrently to the navy yard, Washington, as naval constructor at that station, in conjunction with duties at the navy yard and at the bureau of construction and repair. At all times prominently associated with all matters affecting the designing and construction of our naval vessels, he was while acting in these dual capacities, also a member of several boards, prominent among which was the board of inspection and survey, and the board of life boats. While a member of the latter board, he gave especial attention to life saving appliances, and a careful consideration of this subject resulted in the invention of the Franklin life buoy. Its simplicity, compactness and manifest superiority over other buoys caused it to be highly commended at the International maritime exhibition in Boston, by the International maritime conference in Washington, the world's fair at Chicago, and has secured it a medal from the Paris exposition of 1900. This buoy has been in use in the United States navy for a number of years, and its use at present in the Russian, Japanese, German, French and English navies, as well as the merchant service, attests to its merit. Notably among the records of its performances is that of saving the lives of two of the crew of the late *Maine* off Hatteras, Feb. 6, 1897. A whaleboat that was launched could not "live" in the high seas caused by the storm then raging; the men had been lost to sight temporarily, but by the lights of the Franklin life buoy, to which they had swam, they were soon discovered and rescued. This buoy, although but normal size, supported these two men for over an hour. On July 12, 1893, Naval Constructor Philip Hichborn was appointed by the president of the United States to the highest position within the gift of the construction corps of the navy, that of chief constructor and chief of the bureau of construction and repair, with the relative rank of commodore. Twice has he been appointed to that office, and the eight years of his occupancy has resulted in great credit to the navy. He has been, for a number of years, a member of the Institute of Naval Architects of England, and was a few years ago elected an honorary life member of the organization, a special distinction; of the Naval Institute of Annapolis, and one of the vice presidents of the Society of Naval Architects and Marine Engineers of the United States since the organization of that society. He has devoted much time to literary work, chiefly upon subjects of a professional nature. He has always been a staunch advocate of sheathed ships, and although meeting with much opposition, has steadily persevered, and by incontrovertible argument has at last succeeded in having sheathed ships introduced into our navy. His article upon "Sheathed and Unsheathed Ships," published in the proceedings of the Naval Institute, April, 1889, provoked editorial discussion by the leading professional and representative paper in this country, but no more so than the invincible reason for sheathing presented to congress in pamphlet form a few years later. The proper form and requirements for "ship boats" has occupied his attention for a number of years; in fact, this has been one of his successful "hobbies" ever since he was a shipwright. While at Mare Island navy yard he designed, built and sailed a boat that in a race of ten miles distanced all competitors, and won for him a silver tea set valued at over \$300. While at the navy yard, League Island, he designed a complete set of ships boats, which were adopted as standard and built for all vessels of the navy. A pleasing incident in this connection occurred while he was abroad in 1884. A race was arranged between several boats of the English men-of-war and those of the United States steamer *Lancaster*, and Mr. Hichborn had the pleasure and gratification of seeing the crews of the *Lancaster* victorious in boats of his design. He has recently issued a book, under authority of the department, entitled "Standard Boats of the United States navy, for use in navy yards and stations," in which the general plans of each size of boat are shown in conjunction with photographs and details of same. No book embracing such minutia in such matter has ever been published in any navy. Having been raised in navy yards, he has always felt a kindly interest in their behalf, and has worked hard and steadily to bring them to the perfection now attained.

After re-designing the *Puritan* he turned his attention to inclined or deflective armor, and to his strong and determined advocacy, the inclined front plate of turrets and the adoption of the present very efficient balanced turret is due. Recently his aggressive desire to have the navy come to the front rank among the navies of the world, by the adoption of appliances and fittings of known value, has caused considerable friction between him and the other officers of the board of construction, but his determination and logic has caused the adoption of many modern improvements, notably among which are electrical appliances on shipboard, water tube boilers, fireproof wood, submarine boats and the change from 13-in. to 12-in. guns as the largest caliber gun to be used in the navy. His own inventive and practical genius has contributed many valuable improvements in ship fittings. His sole object has been to make the officer and sailor more comfortable and the ship more efficient. The elegant models of the ships of the navy, which have excited such admiration at home and abroad, have all been made under his direction. They are the finest ever constructed, and without doubt have done more to build up the navy than any written or verbal argument. So great is the demand

by expositions for exhibition purposes that these models are to be seen for brief periods only, in the corridors of the navy department, where they were intended to be on permanent exhibition.

THE DESCENT OF THE ADMIRAL.

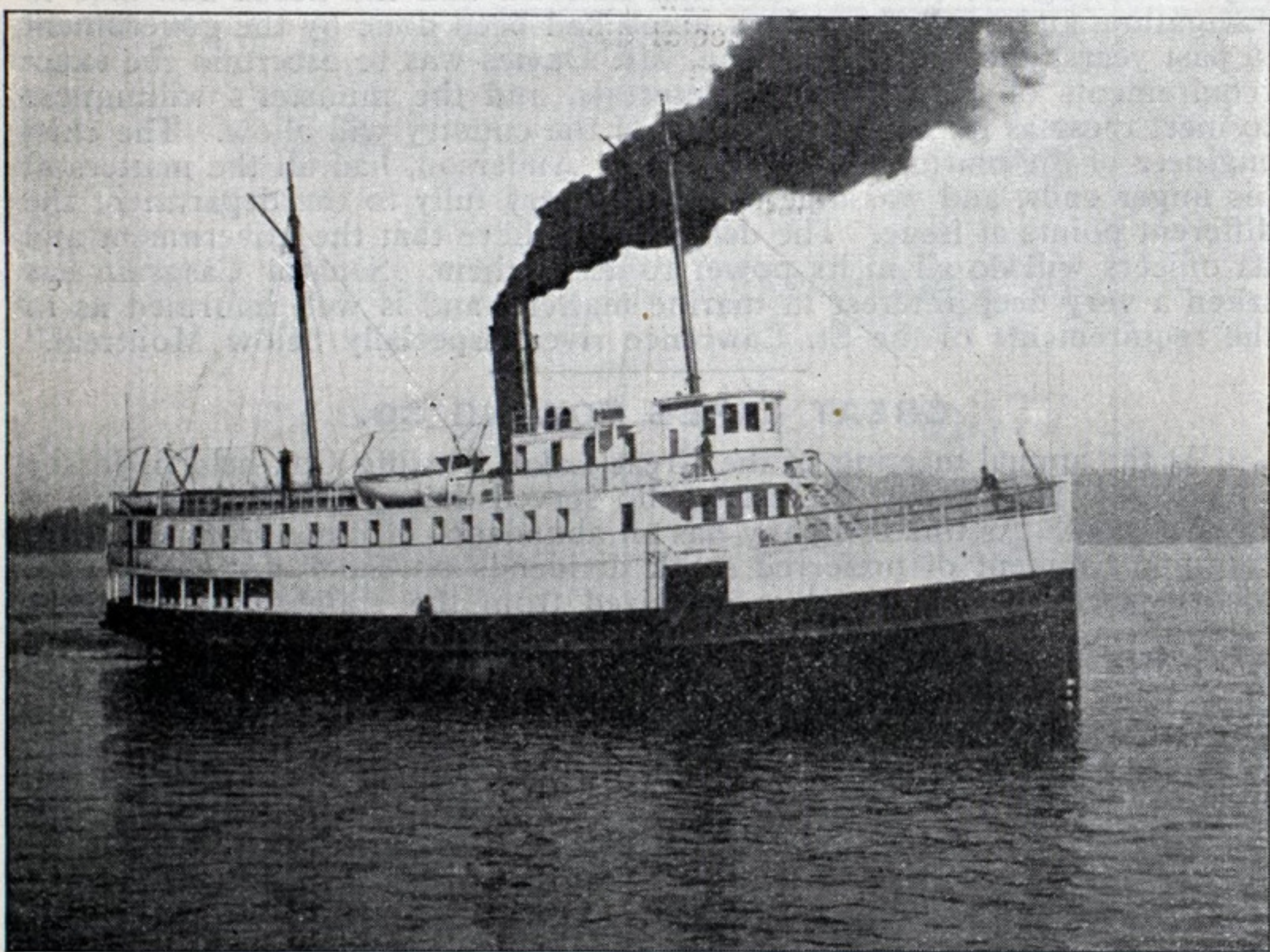
Rear Admiral Hichborn is a descendant of an old colonial family of unquestioned patriotism, one member of which, Deborah Hichborn, was the mother of Paul Revere—and of a stock that later became one of the foremost of the renowned ship building and seafaring families of New England. In November, 1875, he was united in marriage to Miss Jennie M. Franklin of Vermont, a lady whose many accomplishments are highly appreciated by those honored with her acquaintance. To the charming disposition of his esteemable wife and the complete domestic happiness that has always existed. Mr. Hichborn owes much for the continued success in his professional career.

Chief Constructor Hichborn has, for a number of years, been president of the Navy Mutual Relief Association. While on the Pacific coast he was initiated into the mysteries of free masonry, becoming a member and worshipful master of Naval lodge No. 87, of Vallejo, California. He advanced through the various graduations and in 1874-5 he served as captain general of De Witt Clinton commandery of Portsmouth, N. H. After reaching the top of the York Rite, he associated himself also with the ancient and accepted Scottish rite, and advanced to the thirty-second degree, the highest but one that can be conferred in masonry. His colonial ancestry made him eligible to the Sons of the American Revolution, of which organization he is an efficient and popular member.

The life of Admiral Hichborn has been a busy one; his advancement has been earned through strict application to whatever duty he was set to perform. Ambitious to excel, he has received the recognition of his labors. Always kind, sympathetic and considerate in his treatment of subordinates; a thorough mechanic and master of his profession, he has the confidence and respect of his men, who have invariably acknowledged their appreciation of his generous consideration by strict obedience to orders and faithful performance of duty. Without requesting, and much less demanding it, he has at all times received the full measure of each employe's labor, which has gained for him that enviable and merited reputation for excellent management and executive ability, and which has been the prime cause of his success.

MAINLANDER, OWNED BY WESTERN STEAM NAV. CO.

One of the most successful vessels on the Pacific coast is the Mainlander, owned by the Western Steam Navigation Co., operating between Tacoma, Seattle and Vancouver, B. C. She was built by Crawford & Reid, Tacoma, Wash., and is of the following dimensions: 162 ft. over all; beam, 28 ft.; molded depth, 12 ft. 6 in.; gross tonnage, 505; net tonnage, 343. Her engines are triple expansion, with cylinders of 16, 27 and 44 in. diameter, and a stroke of 24 in., built by John B. Hardy, Tacoma, Wash. She is equipped with Seabury water tube boilers and Wheeler admiralty condensers. Her bunker capacity is 60 tons and her speed 14 miles per hour. Her designer was E. L. McAllister, Seattle, Wash. The Main-



MAINLANDER, OWNED BY THE WESTERN STEAM NAVIGATION CO.
Built by Crawford & Reid, Tacoma, Wash

lander is named in honor of the people of Vancouver, who live on the mainland of British Columbia, and are called, therefore, Mainlanders to distinguish them from the dwellers on Vancouver island. She is built of specially selected winter cut Douglas fir (Oregon pine), fastened with locust treenails and galvanized iron. All lights, including masthead and side, are electric. The dining room is aft on the main deck. Adjoining this is a pantry or galley. The main deck is used entirely for freight, the smoking room and crew's quarters being below. The upper house is brought out flush with the lower, giving more room in the main saloon, in which no smoking is allowed, thus giving ladies and non-smokers free access to the forward observation room and purser's office. She has thirty-one staterooms, equipped with Hartford link spring mattresses on enameled iron frames, and has accommodations for ninety-three passengers. The interior of the vessel, being finished with white enamel and mahogany, is especially fine. The vessel is heated throughout with steam.

The four-masted schooner Charles S. Hirsch, building at the ship yard of Kelley, Spear & Co., Bath, Me., will be launched this week.

DEPENDING UPON SUBSIDIES.

IMPORTANT CONTRACTS WITH ATLANTIC COAST SHIP BUILDERS—A BIG BUSINESS IN SIGHT, EVEN WITHOUT THE GOVERNMENT AID.

It was announced a few weeks ago that the Atlantic Transport Co. had placed with the New York Ship Building Co. at Camden, N. J., a contract for four very large cargo steamers, conditioned upon the passage of the ship subsidy bill. The vessels are to be of twin-screw type, 12,000 tons displacement each, and to cost \$1,250,000 each. Now comes the announcement that the Boston Steamship Co. of Boston, Mass., has placed a conditional contract with the Maryland Steel Co. for two large combination freight and passenger steamships for transatlantic service, similar to the two illustrated in the recent ship building edition of the Review. A condition in this case also is the passage of the shipping bill. The Maryland company is already building several very large "tramps" for ship-owning companies that propose to increase their interests in foreign trade shipping, irrespective of what congress may do regarding subsidies. "We are all watching the progress of the subsidy bill," says one of the officials of a large seaboard yard, "as every ship yard on the Atlantic has contracts in view that depend upon this measure. If the bill is not passed we will still be busy on the large number of new orders for naval vessels given out of late and on a demand for coasting ships that will about keep the present ship yard capacity employed for the next two years, but what a humming condition of affairs would follow the passage of the subsidy bill! In any event it is quite certain that if big tramps of the kind now building at the Maryland yard can live without government aid we will soon find a large amount of capital going in for the transatlantic business in American bottoms." The two new vessels for the Boston Steamship Co. will embody every modern feature of ship builders' art and will rank at the head of the list of their class. They will be 480 ft. keel, 508 ft. over all, 58 ft. beam and 40 ft. deep. They are designed to carry 10,000 tons of cargo and 1,200 tons bunker coal. Hulls will be of mild steel and each ship will have six water-tight bulkheads and six partial bulkheads. They will have double bottoms with a capacity for 1,900 tons water ballast. They will have nine large cargo hatches, will be fore-and-aft two-mast rig and have five derrick posts adapted for ventilation. The freight will be handled by twelve double-cylinder winches. Steam windlasses will be provided for handling heavy stockless anchors. The engines will be of the triple expansion type and the vessels will have a speed of 14 knots light and 12 knots loaded. There will be a superstructure amidships for a limited number of passengers.

The steamship M. S. Dollar, which the New York Ship Building Co. of Camden, N. J., is building for M. S. Dollar & Co., San Francisco, is nearing completion. The vessel is designed for service between San Francisco and the Hawaiian islands. The vessel is 300 ft. long, 40 ft. beam and 26 ft. deep. She is of 3,000 tons displacement and is designed for a speed of 11 knots. The new steamer will be schooner rigged, carrying a fore trysail of 44 sq. yds., main trysail of the same size, a fore trysail of 71 sq. yds. and a main trysail of 75 sq. yds. The main rigging will be of galvanized iron wire, of superior quality, the shrouds being 3½ in. in size, 650 ft. in all. The fore and main stays will be of 3¾ in. wire, 140 ft.; the fore and main topmasts stays, 2¾ in., 190 ft.; the derrick topping lifts, 4½ in., 260 ft.; the derrick guys, 4½ in., 600 ft.; the funnel guys, 1¾ in., 175 ft.; the davit guys, 1¾ in., 150 ft., and the guides for mast headlight, 1 in., 130 ft. long. The steamer will carry two lifeboats and a dinghy.

The Burrell Dry Dock Co., Port Richmond, S. I., launched last week the ferryboat Chicago for the Pennsylvania Railroad Co. The vessel is of the following dimensions: Length over all, 206 ft.; length to outside of propeller posts, 179 ft. 6 in.; breadth of beam, molded, 46 ft.; breadth of beam, over guards, 65 ft.; depth base line to top of deck beams amidships, 17 ft.; depth base line at end to top of deck beams, 16 ft.; depth of hold, 15 ft. 4 in. The hull is of mild steel, subdivided into five compartments. The Chicago has a compound engine with three cylinders. The high pressure cylinder is 22 in. in diameter and the two low pressure cylinders are each 32 in. in diameter by 24 in. stroke. Thornycroft water tube boilers are used. Other work now on hand at the ship yard includes a large steel seagoing tug, which is being built for sale, and a steel tug for the Cornell Towboat Co.

It is announced that a new ship yard is to be built at Pensacola with a cash capital of \$600,000. George W. Wright of Pensacola is to be president and Mr. Dushman secretary, with the following residents of New York as stockholders: W. H. White, J. T. Van Sickle, H. T. Knowlton, Percy P. Williams and Francis G. Graham, who will also constitute the board of directors. The plant will be modern in every particular.

THE CRAMP-VICKERS AND MAXIM COMBINATION.

The Cramp-Vickers and Maxim combination seems to exist only in the empty, vast and wandering atmosphere. Articles, ponderous enough to resemble verity, have issued from time to time in the press, but it seems as though there was really nothing in them. Mr. Charles H. Cramp discussed the latest story in his usual picturesque style:

"It is all rot, this constant talk of a deal," he said. "I imagine I would know something about it if it was about to be consummated, and I can simply say that it is not so. The stories are made up of a lot of old rumors, warmed up and spread around, and it seems all that somebody in London has to do is to say that the deal is off or on and away go the papers to speculating about something that there is nothing in. I think I have put myself squarely on record in regard to such combinations, as I would deem advantageous, and there is no need to go into it again. I presume they will keep on speculating and guessing, but I am tired of entering denials every time somebody wants to put a report into circulation."

The president and the secretary of the navy have already selected the names to be bestowed on the next four armorclads authorized by congress. They will be called the Connecticut, the Louisiana, the Tennessee and the Washington. The naval bill, which has passed the house, calls for two battleships and two armored cruisers. If only two ships are authorized by the senate they will be named the Connecticut and Louisiana.

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

Published every Thursday at No. 418-19 Perry-Payne building, Cleveland, Ohio, by THE MARINE REVIEW PUBLISHING CO.

SUBSCRIPTION—\$3.00 per year in advance; foreign, including postage, \$4.50, or 19 shillings. Single copies 10 cents each. Convenient binders sent, post paid, \$1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second-class Mail Matter.

During the past week the discussion in the senate upon the shipping bill has become decidedly acrimonious. The measure has practically made no headway whatever. The minority has filibustered, notwithstanding the declaration of Senator Jones, the Democratic leader, that filibustering would not be resorted to. Of course if these tactics are continued the bill cannot pass during the present session. Under the rules of the senate a vote cannot be taken as long as any member cares to discuss the measure. Night sessions were held last week in order to hasten discussion upon the bill, but they failed woefully of their purpose. The shipping bill was hardly discussed at all, the nights being taken up with aimless discussion of extraneous matter. Moreover, it was almost impossible to preserve a majority in attendance, the great age of a number of the senators making the task of attendance an exceedingly fatiguing one in a physical sense. Senator Teller, who walked out of the Republican convention in 1896 owing to its attitude upon the money question, and who has not been since then regarded as a Republican, denounced the bill as jobbery. He declared that it bore evidences of an attempt to protect certain interests and to put into the hands of a few men the money belonging to the people. This statement thoroughly angered Senator Hanna, who took it as a personal affront. He said that the only motive in the bill was to uphold the merchant marine of the United States.

"So far as I am concerned," he said, "I propose to occupy the same position in regard to this bill from now on until the fourth of March which I occupy today. I will demand fair treatment, for it is an honest measure with an honest intent, and I do not propose to be sidetracked by any senator on the other side. It has not been the purpose of the friends of this bill that it should interfere with any necessary public business, and it has not done so. My interest in it is because I believe it to be for the interest of the people of the country. I believe that it means the upbuilding of a new industry—a kindred industry to those that have made this country great and prosperous. It means another step in the direction of development—not confined to section or to party. I resent the charge that it is a measure to loot the treasury. If such measures have for their object to get money out of the United States treasury, what about the river and harbor bill and many other bills which we have heard of within the last few weeks. I make no charge, but I do say, and say it most emphatically, that there are measures proposed in that bill (the river and harbor bill) which pale the shipping bill."

It had been known for some time that the senator was opposed to several provisions of the river and harbor bill on the ground that these provisions were imposing a burden that the general government should not bear. It is not surprising therefore to get the report that the bill is to be radically amended. As far as the breakwater in Cleveland is concerned, the senator has contended that the government function ended with the establishment of a harbor of refuge. He has therefore caused the proposed extension to end at Case avenue. The house bill provided for the breakwater to be extended to Gordon park. The senate committee on commerce, which has the bill in charge, added a number of items to the house bill until the aggregate appropriation reached \$67,000,000. Then it decided to make a horizontal cut of 25 per cent. on all items under \$50,000 and 33 per cent. on all items over \$50,000. The result of this is that Cleveland gets for regular harbor improvement \$93,750, instead of \$125,000; for the extension of the breakwater, \$450,000, instead of \$600,000; and for continuous contract work, \$1,466,667, instead of \$2,200,000; West Neebish channel, St. Mary's river, \$375,000 instead of \$500,000, and for engineer's contracts \$2,666,667, instead of \$4,000,000. For Detroit river improvements \$375,000 is made available, instead of \$500,000, and for the Lake St. Clair canal the sum of \$248,500 is appropriated, instead of \$330,000. Other Lake Erie ports are not materially changed. While a week ago it looked as though the bill would not pass during this session there is hope for it now.

It is an unfortunate circumstance that partisanship and controversy in congress has made it impossible for the president to bestow upon the naval men engaged in the battle of Santiago the rewards which they deserve. Were it not for the unfortunate dispatch which Admiral Sampson sent to the president on July 3, 1898, the controversy would never have arisen. He is the actual, and should be the incontestible hero of the battle of Santiago, but the American people conceived him by his dispatch to be ignoring the services of another man concerned in the engagement. Admiral Sampson probably intended nothing of the kind. He merely

lacked facility of language. His flagship, the New York, was unavoidably absent from the scene of the engagement, but Sampson nevertheless was responsible for the plan of action. He certainly would have been held to account had the American squadron been defeated. Admiral Schley was the ranking head in the actual conflict, but it does not follow that he was the directing head. Each ship was fought by its own captain upon a pre-arranged plan. There is no disposition to deny to Admiral Schley the honor that is due him. It was his rare good fortune to be in the thick of the fight, and there is reward for his services; but it would be perversion of justice to deny to Sampson first place. It belongs to him.

It is quite clear that the naval board of construction has not known its own mind for several months. After mature deliberation last year it voted to equip the Georgia class of battleships with superposed turrets and the Virginia and Rhode Island with the quadrilateral plan of battery. This, of course, was merely a compromise and proved nothing. The superposed plan is either good or it is bad. If it is good it should be adopted in whole; if it is bad it should be rejected altogether. The naval board in its latest mood evidently thinks that it is good, for it has rescinded its former action and has voted to equip all the new battleships, including the two authorized in the act now before the senate, with superposed turrets. This is better than compromising.

CO-OPERATION OF CANADIAN VESSEL OWNERS.

Capt. George P. McKay, chairman of the Lake Carriers' committee on aids to navigation, has received a letter from John Gaskin, outside manager of the Montreal Transportation Co., to the effect that boards of trade and city councils in the different cities in Canada are adopting resolutions calling upon their several representatives in the house of commons to enact legislation looking to uniformity in the navigation laws of American and Canadian waters on the great lakes. He speaks with the utmost encouragement of the outlook. Referring to the recent visit of Capt. McKay to Ottawa to secure co-operation on the subject of navigation rules and to obtain, if possible, additional aids to navigation in the vicinity of Pelee passage, Lake Erie, the British Daily Whig says:

"Capt. T. Donnelly, who has returned home, assisted in putting the requests of the mariners before the government. The captain speaks in the highest terms of the reception the mariners and their friends met with. He states that they feel themselves under deep obligations to Hon. Mr. Fitzpatrick, solicitor general, Senator Casgrain, Col. Gourdeau, deputy minister of marine, and Col. Anderson, chief engineer of the marine department. The delegation was accompanied by W. J. White, K.C., Montreal. Hon. Mr. Fitzpatrick went into the legal points concerned in the request regarding uniformity in navigation laws and explained the matter very fully and patiently to the delegation. The deputy minister of marine, Col. Gourdeau, stated that the government was fully alive to the necessity of having the rules of the road uniform and the needs and aids to navigation, and pointed out how much had been done by the government in past years, and how eager Hon. Mr. Davies was to ascertain the exact requirements of the navigation interests, and the minister's willingness to meet these as far as the resources of the country will allow. The chief engineer of the marine department, Col. Anderson, had all the matters at his finger ends, and was able to explain very fully to the department the different points at issue. The delegation believe that the government and its officers will do all in its power to assist them. Senator Casgrain has taken a very deep interest in marine matters, and is well informed as to the requirements of the St. Lawrence river, especially below Montreal."

GREAT LAKES TOWING CO.

At the annual meeting of the Great Lakes Towing Co., held in Jersey City, N. J., Wednesday, directors who served during the past year were all re-elected. As this company has an abundance of funds from which to continue payment of preferred stock dividends on the 7 per cent. basis, the suspension of dividend is criticized from the standpoint that it is recognizing a competition that was not of a serious kind. With the large amount of undivided profits shown in a statement from the company, it is more than probable that the dividend passed now will be paid later and this is why the stock has not been materially affected. Directors elected in Jersey City are: Gen. G. A. Garretson, Mr. W. G. Mather, Mr. L. M. Bowers, Mr. L. C. Hanna, Mr. H. G. Dalton, Cleveland; Mr. C. W. Elphicke, Chicago; Capt. James Ash, Buffalo; Mr. C. D. Thompson, Port Huron; Mr. C. E. Grover, Cleveland; Capt. James Davidson, West Bay City; Capt. A. B. Wolvin, Duluth; Mr. Edward Smith, Buffalo; Mr. T. F. Newman, Cleveland; Mr. W. T. Coleman Carpenter, Jersey City.

Officers and members of the executive committee will be elected at a meeting to be held later in Cleveland.

The Asbestos Manufacturing Co., 426 Market street, Philadelphia, has issued a half tone print of the Russian cruiser Variag, which is an exceedingly beautiful thing. The novelty of the picture consists of having been modeled in clay and photographed in the highest art. The conditions attending the insulation of the steam pipes and boilers on this ship were the most severe ever exacted, from the fact that a working pressure of 250 lbs. of steam to the square inch is used and must be properly protected from loss by radiation and condensation in order to get the high speed demanded. This vessel made the wonderful record of 24.06 knots on her trial trip. This is one of the evidences of the thoroughness with which this company does its work.

At the annual meeting of the American Iron & Steel Mfg. Co., held Feb. 13 at Lebanon, Pa., J. H. Sternbergh was elected president and general manager, succeeding Arthur Brock as president and James Lord as general manager. Mr. Sternbergh is a pioneer in the nut and bolt industry.

The Fore River Engine Co., Quincy Point, Mass., has been incorporated with a capital stock of \$4,000,000.

LAKE BUILT VESSELS FOR OCEAN SERVICE.

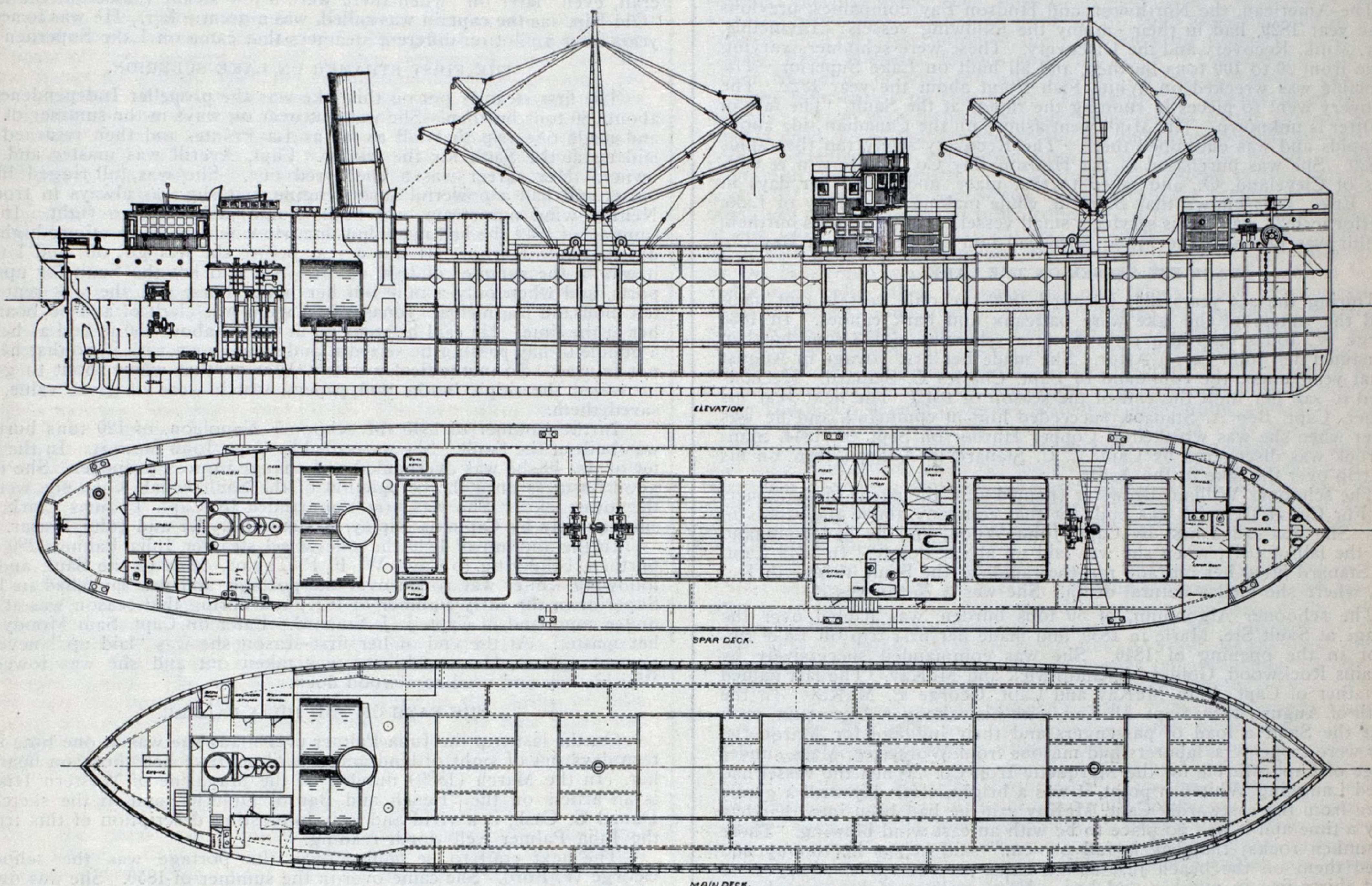
Since the first description of the four steam cargo vessels which are being built at the Chicago yard of the American Ship Building Co. for the Northwestern Transportation Co., of which Charles Counselman and others are the prime movers, was published in the Review, certain changes have been made in them. The accompanying plans show the vessels as constructed. They are of Canadian canal size, and are of the following dimensions: 256 ft. long, 42 ft. beam and 26½ ft. deep. Their capacity in gross tons is about 2,900. They are equipped with triple expansion engines, having cylinders of 20, 33 and 54 in. diameter, with 40 in. stroke, and have two Scotch boilers 12 ft. 9 in. by 11½ ft. They are designed for the carrying of package freight. They have three gangways on each side and have steel main decks. Machinery, as is usual in vessels of lake construction, has been placed in the stern with pilot house well forward. Ocean freight steamers usually have their cargoes hoisted from hatches and the gangways in these vessels will therefore be something of an inno-

have been as second mate of such vessels. Applicants for license as second mate of ocean or coastwise steam vessels must have had at least three years' experience on such vessels—one year of such service to have been as quartermaster or third mate on such vessels. Applicants for license as third mate of ocean or coastwise steam vessels must have had at least three years' experience on such vessels as a mariner or quartermaster. It is provided, however, that persons whose experience at sea has been on sail vessels of over 700 gross tons may be licensed on the following conditions, namely:

"Master.—Any person who has had five years' experience on such sail vessels, two years of which must have been as master of such sail vessels, may be licensed as master of ocean and coastwise steam vessels.

"Chief mate.—Any person who has had five years' experience on such sail vessels, two years of which he has served in the capacity of chief mate, may be licensed as chief mate of ocean and coastwise steam vessels.

"Second mate.—Any person who has had three years' experience on



ELEVATION AND DECK PLANS OF NORTHWESTERN TRANSPORTATION CO.'S VESSELS.

vation. These ships are built for transatlantic service. It is expected to have them deliver in Liverpool cargoes direct from Chicago. Of course, they may be changed to Atlantic seaboard or lake trade if the foreign trade does not prove profitable. The peculiar appearance of their spars is due to the fact that they are made to comply with requirements of the Manchester canal service.

CHANGES IN STEAMBOAT RULES.

An official report of the annual meeting of the United States board of supervising inspectors of steamboats, held in Washington recently, has just been issued from the office of James A. Dumont, supervising inspector general. The following named devices were approved by the board, and have also received the approval of the secretary of the treasury: Mayo rescue lifeboat, presented by the Mayo Lifeboat Co., R. D. Mayo, president, Muskegon, Mich.; Carley life float, presented by the Carley Life Float Co., M. T. Whiton, president; life-preserver presented by J. B. Hamilton, Springfield, Mass. The board approved coil and pipe boilers presented by the following named persons and firms, when such boilers are constructed in all their parts of wrought iron, steel, or cast steel, in the manner as provided in the general rules of the board: L. Boyer's Sons, New York; Bugbee & Laycock, Chicago (Authentic water-tube boiler); Chas. R. Cowley and Howell C. Cooper, Everett, Mass. (Cowley & Cooper boiler); Henry Ernst, New York; A. C. Evans, Norfolk, Va.; George L. Haman, Detroit; Ernest N. Janson, Washington, D. C.; L. A. Langmaid, Bath, Me.; Marine Boiler Works, Chicago; F. W. Ofeldt & Sons, Brooklyn; Parker Engine Co., Philadelphia; Thomas B. Perkins, Grand Rapids, Mich., and George S. Wolf, West Dover, O.

Changes made in the general rules and regulations of the board are few in number. Probably the most important change as to licenses is in rule 5, section 14, the third paragraph of which has been amended so as to contain the following provisions:

"No original license as master of ocean or coastwise steam vessels shall be issued (except as hereinafter provided) to any person who has not had at least three years' experience on seagoing or coastwise steam vessels, one year of such service to have been as chief mate of such vessels; nor shall any person receive an original license as chief mate of ocean or coastwise steam vessels who has not served at least three years in the deck department of such steam vessels, one year of such service to

such sail vessels, one year of which has been in the capacity of second mate, may be licensed as second mate of ocean and coastwise steam vessels.

"Third mate.—Any person who has had three years' experience on sail vessels as mariner may be licensed as third mate of ocean and coastwise steam vessels."

Among new rules adopted, and which, alike to amendments, have all the force of law, are the following:

Rule 2, section 40.—"Throttle or stop valves attached to steam chests of steam engines, boilers or superheaters, also casings of slip joints in steam pipes, may be made of cast iron when made of suitable thickness and proper material for pressure allowed on boiler."

Addition to section 14, rule 5, at end of ninth line of the section.—"It being further provided that masters of barge consorts on the great lakes having had three years' experience as such master and who hold license as first-class pilot may be examined and licensed as master of steam vessels."

Rule 9, section 8, new paragraph.—"It shall be the duty of local inspectors to insert in blank spaces provided therefor in the authorized certificates of inspection (new form being printed) of all steam, gas, fluid, naphtha or electric motor vessels a sufficient number of licensed officers, firemen and deck crew to at all times manage the vessel; also the proper number of watchmen in the cabins and upon deck to guard against fire and other disasters and to give alarm in case of accidents."

Two paragraphs in which important amendments have been made are printed in full herewith:

Rule 2, section 38, fifteenth paragraph.—"No connection between shell of boiler and mud drum shall exceed 9 in. in diameter and the flange of the mud drum leg shall consist of an equal amount of material to that cut out of the shell of boiler."

Rule 9, section 8, fourth paragraph.—"It shall be the duty of all inspectors, before granting an original license or renewing an existing one to a master or pilot of steam vessels for any waters, who has not been employed as master or pilot of steam vessels on such waters during the three years preceding the application for renewal, to satisfy themselves by an examination in writing, or orally to be taken down in writing by the inspectors, that such officers are thoroughly familiar with the pilot rules upon the waters for which they are licensed."

EARLY DAYS ON LAKE SUPERIOR.

AN AUTHENTIC ACCOUNT OF CONDITIONS WHICH EXISTED PRIOR TO THE OPENING OF THE SAULT ST. MARIE CANAL—LIST OF THE EARLY SCHOONERS AND STEAMBOATS.

There is no phase in the history of the lakes so fascinating as the development of the Lake Superior region. It is virtually the opening of a new world to the artisan and tourist. It is really the birth of the greatest industrial giant that the world has ever beheld. There has never been anything like it elsewhere on the globe—this wonderful iron-ribbed country. The Review has succeeded in digging up a brief history of the early days on Lake Superior, written about fifteen years ago by one who signs himself Shob-wau-way, to which it has added a little of its own research, and the Review is sure that it will be read with interest by everyone who is associated with the development of lake commerce.

The American, the Northwest, and Hudson Bay companies, previous to the year 1829, had in their employ the following vessels: Invincible, Otter, Mink, Recovery and the Discovery. These were schooners varying in size from 20 to 100 tons burthen, and all built on Lake Superior. The Invincible was wrecked on White Fish Point about the year 1822. The Discovery went to pieces in running the rapids at the Sault. The fate of the Otter is unknown. The Mink went ashore on the Canadian side above the rapids and was entombed there. The Recovery safely ran the rapids in 1829. She was purchased of the Hudson Bay Co. by Merwin & Giddings of Cleveland, O., and taken to that place, and ended her days in Lake Erie. It is known that Bayfield, while making his survey of Lake Superior in 1823, had in his service a small vessel of about 20 tons burthen, and this was probably the Mink, furnished him by the Hudson Bay Co.

EARLIEST VESSEL ON THE LAKE.

During the six years that followed 1829 the only vessels that navigated the waters of the lake were batteaux and bark canoes. In 1835 George W. Jones built above the Sault a schooner of 113 tons burthen and named her John Jacob Astor. She made her first voyage in August of that year, under the command of Capt. Charles C. Stanard. He continued to sail her until the end of the season of 1842. The next year his brother, Capt. Ben A. Stanard, succeeded him in command, and he was on her when she was wrecked at Copper Harbor on Sept. 20, 1844. Stanard rock was discovered by Capt. C. C. Stanard in August, 1836, on his first trip over the lake in the Astor.

The schooner William Brewster (named after the agent of the American Fur Co. at Detroit) was built for that company above the rapids in 1838. She was sailed first by Capt. John Wood, and he had command until the fall of 1841, when she was laid up at La Pointe. In 1842 Capt. Ben Stanard fitted her out and ran the rapids at the Sault, thence to Detroit, where she died a natural death. She was a 75-ton vessel.

The schooner Algonquin, of 50 tons burthen, was hauled over the portage at Sault Ste. Marie in 1839, and made her first trip on Lake Superior in the opening of 1840. She was commanded successively by Captains Rockwood, Goldsmith, Smithwick and McKay. The last named was father of Capt. John McKay and Capt. George P. McKay. In the month of August, 1849, Capt. McKay, with his schooner Algonquin, took on at the Sault a load of passengers and their luggage for Marquette. They were carpenters, laborers and masons from Worcester, Mass., under charge of Capt. Marble for the Marquette Iron Co. When the vessel had passed Laughing Whitefish point, it was a bright, clear day with a gentle breeze from the eastward. Capt. McKay said he had been into that bay many a time and it was no place to be with an east wind blowing. "There are sunken rocks; that bay is full of 'em," said he, so he ran up and landed them on the beach just above Little Presque Isle. They were about thirty-five in number and had a large amount of baggage, heavy tool chests, trunks, etc., all dumped on the sand beach. They were compelled to stay there over night, and had neither bedding nor food. They reached Marquette the next afternoon, weary of life, indeed, having left all their baggage where it was landed. The Algonquin was sunk at the dock in 1856. Her upper works were removed, but the hull is in the bull rushes near Duluth yet. An endeavor was made to raise her in 1893 to take her to the World's Fair, but it was abandoned.

The schooner Madeline, belonging to the American Fur Co., 20 tons burthen, was built at La Pointe in 1839. She was sailed by Capt. John Angus, and was wrecked at Isle Royal the same year.

The schooner Sis-co-wit, 50 tons burthen, was built by the same company at La Pointe, and was sailed by the same Capt. Angus. Years afterward she was owned by Capt. Jim Bendry of Baraga. She took on a cargo of corn and oats at the Sault for Marquette in the month of November, 1849, and gave Marquette the cold shoulder by running straight through to L'Anse, or Baraga, and laid up for the winter. Capt. Sam Moody, accompanied by James Broadbent, went from Marquette to L'Anse on snow shoes. Arriving there, they took forcible possession of the vessel, refitted her and sailed for Marquette on Christmas eve, arriving at Marquette on Christmas day with the mercury indicating a temperature of 15 below zero. It was a heroic feat. After her precious cargo was discharged Capt. Moody attempted to get her into the mouth of Chocolog river, but there was either not enough water in the channel or it was too cold and too much ice was in the way. She drifted a few hundred feet southeast of the mouth of that noble stream. That is what became of the Sis-co-wit, sometimes spelled Sis-ko-wit.

In 1845 the following vessels were brought over the Sault portage on to Lake Superior: Schooner Chippewa, 20 tons, Capt. Thomas Clark master and proprietor; schooner Florence, 20 tons, owned by Antrim & Keith, brought over on the Canada side, and sailed by Capt. David Keith. Then followed the monster schooner Swallow, of 80 tons burthen. She was sailed by Capt. Smithwick, and finally became the property of the world-renowned Capt. James Bendry of Baraga. He sold her after the canal was opened and as she was thought to be too large for this lake, she was sent to the lower lakes. The schooner Merchant was next. She was of 80 tons burthen, was brought over the Sault portage in 1845, and was sailed in 1846 by Capt. Robert Brown. The compiler of these lines was at the Sault in 1847, and very anxious to take passage on the Merchant for Copper Harbor, but was refused a passage because she was already overloaded with passengers. I have since ascertained that on her

way up that trip she sprang a leak and sank off Grand Island, about four miles out, in 70 fathoms of water. Not a soul was saved. Passengers and crew are still in her hull and it is in fairly good order, at least this was the case when I looked at her in her last resting place a year or so since. It is only fair to explain to the reader that it was in a dream that I saw her. No other news of her was ever known after she sailed from Sault Ste. Marie that beautiful day in July, 1847.

The next vessel was the schooner Uncle Tom, 90 tons, sailed by Capt. John Angus. Her life on this lake was unprofitable and unlucky, and she was run over the rapids and to the lower lakes.

Up to this time none of these vessels had made any money for their several owners, unless, possibly, those belonging to the different fur companies had indirectly paid for themselves. The schooner Fur Trader, 90 tons, was brought over the Sault portage in 1845. Capt. Calvin Ripley sailed her. About this time the great copper excitement sprung up, and the Fur Trader coined money from the start. She was a great favorite, always lucky, and never had an accident. She was a favorite passenger craft, even "later on" when there were a few steam vessels on the lakes. "Old Rip," as the captain was called, was a great joker. He was for many years after a pilot on different steamers that came on Lake Superior.

THE FIRST STEAMER ON LAKE SUPERIOR.

The first steamer put on this lake was the propeller Independence, of about 280 tons burthen. She was put over on ways in the summer of 1845 and made one trip that fall as far as La Pointe, and then returned and laid up at the Sault for the winter. Capt. Averill was master and part owner. Her career was a checkered one. She was full-rigged like a vessel and had a powerful steam engine, but she was always in trouble. Neither wind nor steam, nor both, would make her go right. In the summer of 1849 she had made but one trip when she went ashore high and dry in Eagle Harbor. It was a year before she was got off, and I think it was in the summer of 1850 or '51. She had left the Sault for up-lake ports, and when only a mile out her boiler burst and she was rent into ten thousand fragments. Jonas W. Watson was clerk of and on board of her at the time. He said he went up in the air about 150 ft. and as he saw a bundle of hay passing he seized it and came down with it, so that he was not injured. So methodical was Mr. Watson that when about to go up he seized the ship's books and papers, which were of great value, and saved them.

In the summer of 1845 the schooner Napoleon, of 120 tons burthen, was built at the Sault. She was sailed by Capt. John Stewart. In the winter of '48-'49 she was overhauled and changed into a propeller. She did a good business until the completion of the Sault canal, when she went to the lower lakes. She was first commanded by Capt. Thomas Clark, and subsequently by Captains Ripley, Redmond Ryder and John Fraser.

In the autumn of 1849 the side-wheel steamer Julia Palmer, 280 tons burthen, belonging to Capt. W. F. P. Taylor, came to the Sault and the following winter was rolled over the portage, and was launched in Lake Superior in the early summer of 1847, and during that season was at first under command of Capt. J. J. Stanard. Later on Capt. Sam Moody was her master. At the end of her first season she was "laid up," never to go out again. Her machinery was taken out and she was towed to Waikia bay and used as a wood dock.

THE FATE OF THE JULIA PALMER.

On the last trip the Julia Palmer ever made she was at one time fourteen days out of sight of land and a perilous time had those on board of her. In the March (1889) number of the Magazine of Western History is an article on the "Bench and Bar of Duluth," and in the sketch of Daniel G. Cash, is a vivid and very interesting description of this trip of the Julia Palmer well worth reading.

The next craft to be hauled over the portage was the schooner George W. Ford. She came over in the summer of 1850. She was owned and sailed by Capt. John Parker. Capt. Parker had been mate and pilot on the lake for many years, and was a good sailor, a careful manager, and under him she made money.

I have said the propeller Napoleon came out in June, 1849. On her first trip she sailed into Marquette (then called Carp river) and came to anchor a little over four miles east of the dock now occupied by F. B. Spear. She brought quite a number of passengers and a large amount of freight for this place. The passengers begged Capt. Clark to "heave anchor" and run a little farther up into the bay, but the proud autocrat of the propeller Napoleon swore, raved and stormed, striding his decks in the wildest excitement and declaring that if other people had no regard for the safety of his boat and passengers, he had! He "had explored every square yard of that bay a thousand times and found it full of sunken rocks! No sir! No sane man would ask him to endanger the safety of the boat by running into that bay."

RIVALRY BETWEEN THE MANHATTAN AND MONTICELLO.

The next steamer was the fast sailing, staunch upper-cabin propeller Manhattan, 380 or 400 tons burthen, commanded by Capt. Caldwell. She was brought over the portage and put on Lake Superior in the interest of Spaulding & Bacon, later on Spaulding & Childs. The Manhattan's Lake Superior career began in 1850 and lasted until she went ashore and was wrecked in trying to enter the Grand Marais harbor (below the Pictured Rocks) in the summer of the year 1858. In her day she was a faithful and useful craft. In June, 1851, the propeller Monticello was brought over the portage by Col. Sheldon McKnight. Col. McKnight had owned or controlled the Independence and the Napoleon, and now the Monticello was brought on to throw the opposition boat, the Manhattan, into the shade. Capt. John Wilson sailed the Monticello. A fierce war of rates on passengers and freight commenced, and bitter feeling ran very high between the two lines. In the month of August that year a collision occurred between the Manhattan and Monticello. It could easily have been avoided but each boat was bent on destroying the other. The Manhattan was cut down and sunk near Parisian island. No lives were lost. Mrs. A. R. Harlow was a passenger on the Manhattan, when the disaster occurred. The latter was resurrected and reconstructed in six weeks' time and out again. On her first reappearance at Marquette, a deputation of young ladies, dressed in pure white, marched in procession down to the head of the Cleveland dock, bearing in their hands bouquets of the choicest of our flowers (of that day) and one of them a splendid flag made by themselves. Capt. Caldwell, a weather-

burned, scarred, baldheaded, blunt, yet modest sailor was notified that his presence was desired at the head of the dock. He promptly complied with the request for his presence, bringing the handsome Tom Redington, his clerk, and the diffident "Ad. Lewis," his steward, along to protect him against any violence from shore lubbers. To cut a long story short, one of the young ladies advanced and presented the "stars and stripes" to the captain. He was more than astonished, for once he was nonplussed. Then the party sang a song composed and set to music for the occasion (the subject being "The Manhattan"), and a high-flown old gentleman (Dr. Livermore) mounted the old cast iron cylinder that stood there so many years and read some high-sounding resolutions, eulogizing the Manhattan and ending in a long speech full of the clink of "anvils," "the glow of forge fires," "the buzz and din of machine shops, saw mills, etc." (not a word about railroads), and winding up with the prophecy that Marquette was to be the greatest place in the world. The captain remarked that he "hadn't no doubt on it." Here are two of the twelve resolutions adopted and read at that time. The iron works referred to were those of the Marquette Iron Co. and the Jackson Iron Co., both of which failed afterward:

"Resolved: That in our opinion, Marquette has become a place of business and resort sufficient to warrant its being made a stopping place by all boats on their upward as well as their downward trips, and that the time is not far distant when the commercial business, growing out of these rich and inexhaustible mountains of iron, will alone require more shipping than at this time floats upon this lake.

"Resolved: That in our estimation those iron companies who have been pioneers of operation here, and who have had incredible and unforeseen difficulties, disappointments and misfortunes to grapple with, are deserving of a favoring and fostering consideration, and it is a source of much gratification that the smoke of their fires and the clink of their hammers give indications that days and years of prosperity are in store for them."

After all, the Monticello was the most popular boat that had been on the lake up to that time, but without doubt was cracked through her keel from stem to stern at the time of the collision, for on the 25th of the same month, after coming out of Ontonagon, she was discovered to be making water very fast, and a gale of wind blowing, her fires were put out by the water rising to her furnaces, and she went on the rocky coast about 20 miles above Eagle river and rapidly went to pieces. Several passengers were lost, but many were saved. The then editor and proprietor of the Lake Superior Journal, J. Venen Brown, was one of the saved.

The next steamer was the splendid two-piped, upper cabined, side-wheel steamer Baltimore, put on by the McKnight line. She was put across the portage in the months of June and July, 1852, and was commanded first by Capt. Jack Wilson, then by Redmond Rider, Capt. John Shooks, and finally by Capt. John Reed, who lost her in the summer of 1855, her last trip on Lake Michigan, she having passed through the canal, just then completed.

The propeller Peninsula was the next steamer placed on this lake by the McKnight, or Chippewa Portage, company people. She was put over the portage in the winter of 1852-53, was launched this side in April '53, was commanded by Capt. John Reed, and was wrecked the same year at Eagle river. She did not carry passengers to any extent, but was a large freight carrier. The one-piped side-wheel steamer Sam Ward was brought over the portage by Capt. E. B. Ward in the spring of 1853. (The canal was finished and opened in June, '55). The Sam Ward was commanded by Capt. Easterbrook. She was a very popular passenger boat, and paid for herself two or three times over before the canal was opened.

OPENING OF THE ST. MARY'S FALLS CANAL.

When the canal was completed in 1855, there came the large steamers Illinois, Capt. Wilson, (the first to pass up through the canal); North Star, Capt. B. J. Sweet; Northerner, Capt. Ed. Turner; Lady Elgin, Capt. Thompkins; the old Superior, Capt. Jones; also the propellers Gen. Taylor, Mineral Rock, Northern Light, City of Superior, Lac La Belle. The three last named were all successively commanded by Capt. John Spalding. Capt. Ed. Turner commanded the Northerner, Iron City and last the Ironsides. Capt. Ben Wilkins, who afterward sailed the Winslow for many years, first brought out the propeller Ontonagon. The steamer Illinois was in the year 1868 transformed into a barge, later the Mineral Rock took the same course, the North Star was burned at her dock in Cleveland in March, 1862, the Northerner was lost on Lake Huron in 1858 by collision. The Lady Elgin was lost on Lake Michigan by a collision with the schooner Col. Cook, then named the Augusta, and among the three hundred and odd souls lost at that time was the gallant Capt. Jack Wilson, who had sailed so many different steamers on the Lake Superior route. He was in command of the Lady Elgin and through his heroic exertions many lives were saved. He could easily have saved himself, but would not at the cost of losing others who had trusted themselves to his care and skill. The Superior was wrecked on the Pictured Rocks on the night of Oct. 26, 1856. She was in command of Capt. Jones, who had successively commanded the steamer Albany, the Peninsula and the E. K. Collins, and had lost the two latter named and went down himself with the Superior.

The Superior was a very old craft, fairly rotten at the time of her loss, and should not have been permitted to carry passengers. She had a gallant crew. Twelve of the passengers and four of the crew were saved. It was a fearful story. Those who were saved caught on a shelf of the rocks, under a high cliff, where with great difficulty they clung for five days without food. A snow storm was raging with great fury all the time and the waves continually washing over them. They saw the captain swim to the foot of the rock below them, but were powerless to aid him, and he was drowned in their sight. Eight of the strongest of the crew (the clerk, Henry White, and the steward, Sam Small, among the number) clung to the arms of the paddle wheel (the last remnant of the steamer remaining above water), and dropped off one by one as their strength gave out and they became unable to hold on any longer, and the last one had the watches and other valuables of the party on his person. All this was within 200 ft. and in plain sight of the party on the shelf of the rock. When the news came to Marquette a hurried public meeting was held, money and clothing were raised, and a relief party was dispatched to the scene of the wreck.

Steamers that I have not mentioned that were controlled by Sheldon McKnight, or the Chippewa Portage Co., and engaged in this trade were the Ben Franklin, London, Meteor, Pewabic; and by Capt. E. B. Ward, the Planet, Water Witch, Sea Bird; also the Traveler, Arctic and Cleveland of the John Hutchings line. Then there came the City of Cleveland, belonging to Bidwell & Banta of Buffalo, then the Ogontz, the old Michigan, the F. W. Backus, and so many others that it would be as uninteresting as useless to attempt to follow the chain out further. Of all the men connected with the management of Lake Superior steamers and the passenger and freight business from 1845 to the present time, no other twenty men combined have rendered valuable service equal to that of Mr. J. Tallman Whiting, now of Detroit, for many years manager of the McKnight line at the Sault, and for the last twenty-five years manager or general agent of the great transportation line of steamers from Buffalo and Duluth, to which the China, Japan and India belong.

HISTORICAL RECOLLECTIONS OF SAIL VESSELS.

In connection with the historical recollections of sail vessels and steamers that navigated Lake Superior in early days, I have copied some extracts from a book written by John R. St. John and published in 1846, entitled "A True Description of the Lake Superior Country, Its Rivers, Coasts, Bays, Harbors, Islands and Commerce." I wonder if this was "Prof. St. John" or who and what he was? Perhaps someone can give us some information on that point. In his preface, among other things, he says: "It is with feelings of regret and justice to the ever-to-be-lamented dead, I say, that for the geological and mineralogical information herein presented in a condensed form, I am indebted to Dr. Douglas Houghton's official reports." In writing of the copper of this region, he says: "If there is one fact which characterizes the bounty of nature to ours over the mineral of all other countries, it is the fact, and peculiarity of our Lake Superior native copper, that it is in no instance contaminated with alloys of other metals, the assertion of which fact, when made by Dr. Houghton, was treated as a burlesque by scientific men at home and abroad, who called it 'backwoods mineralogy.' His representations as to the great abundance of copper indicated by 'surface appearances' were treated as 'new century stories,' and Dr. Houghton, smarting under this ridicule, pursued his researches for ten successive years before his reports elicited any public attention. He has gone to his grave in these depths, though immeasurable, and upon a rock, though unseen, which he knew and could determine in his system of philosophy, as well as if the 'waters rolled back' when he came to their margin. He has gone too, in the day when that future he had so long and confidently anticipated was come, and which, by its developments, was about to consummate the silent but prevailing ambition of fifteen years of toil, leaving one point only fully established—that the accepted systems of geology and mineralogy are in many particulars inapplicable to the scene of his labors—of which the above is one proof."

Speaking of Sault Ste. Marie, he says: "Here are built forty or fifty houses which constitute St. Mary's, containing population of 200 inhabitants of all nations, colors, grades and languages, exclusive of the Indian lodges. Their titles are those of 'squatters' and are conveyed by quit-claim of pre-emption, which are recognized, however, by the local courts, and quite a speculation is carried on in 'corner and water lots.' There are two public houses—the poorest house is the best tavern."

Here is a description of Stanard's rock: "This is a granite rock 60 to 80 ft. long, 10 ft. wide, and 4 ft. above the surface of the water. A shoal or other reef puts off to the northwest for 80 rods, but on the other sides the water is deep. This rock was discovered by Capt. Chas. C. Stanard at 4 p. m. August 26, 1835, then master of the brig John Jacob Astor. There are three brothers of the Stanards, all captains on Lake Superior—Charles, Benjamin and John—who have all been for more than ten years there, and are the oldest and best pilots, careful and good seamen, and gentlemen. John, who is master of the schooner Swallow, has come to be called 'the pig leg out of a bag.'"

The following paragraphs, separated by dashes, are other extracts from the work of this writer:

"Dead river is by no means the sluggish river its name would indicate, for it is one of the most rapid of the south shore streams, with waterfalls and cascades. The Indian name was Ne-kom-enon, the 'River of Deaths,' undoubtedly the scene of several deaths of some former time, which the early French called 'Riviere des Morts.' Bayfield, too, called it 'Dead River.' It would be much more appropriate to call it living river."

"I was at Eagle Harbor on the night of the death of Dr. Houghton, where I had an appointment to meet him, the very evening of the disaster, Oct. 13. Comfortably seated by Mr. Sprague's fire, in a bark covered building, 12 ft. square, I little thought of the calamity then befalling the country in the death of Dr. Houghton, a few miles west, whose loss may be estimated by those unacquainted with his character and services when they know that Gen. Cass said on learning of his death that 'Michigan had better owe ten millions.' This was not said of a warrior or statesman, but a quiet man of science and perseverance."

"Hon. E. H. Thomson of Flint, Mich., in a letter to Hon. Lucius Lyon, surveyor-general of Michigan, said: 'Our country, nay, the world of science was looking with more than Argus eyes for his final report of the geology of the northern peninsula. Michigan beheld his scientific talent and moral worth with pride and admiration, but alas, he has tracked his steps of glory to a watery grave. The transcendent genius of Cuvier expired in revealing the colocal and unknown fount belonging to the remote ages of past antiquity; Champoloian died beneath an African sun, deciphering the hieroglyphics of Egypt; Davy fell in the midst of enlarging the boundaries to human knowledge of natural science; and Houghton, like them, has fallen a martyr.'"

"The treaty with the Chippewas, which was consummated in 1842, gave us the mineral lands of the south shore of Lake Superior. These lands were promised to the state of Michigan in lieu of lands which fell to Ohio at the conclusion of the 'Toledo War.' Michigan sent Mr. Houghton in 1835 to make a preliminary examination of the country. On leaving the great copper rock of the Ontonagon in 1835, Dr. Houghton forgot his tomahawk, lying upon that rock, and when he returned

there in 1843, in making his official survey, he found his hatchet, showing that no one had been there in eight years."

This writer describes with great minuteness the character of the country—the rocks, the hills, valleys, timber and the "highland twenty miles in the interior," "twelve hundred and thirteen hundred feet above the lake," but never once in all his 118 pages mentions the presence of iron ore.

EDUCATION OF A SHIP BUILDER.

A MOST INSTRUCTIVE AND EXHAUSTIVE ADDRESS—HULL CONSTRUCTION AND MARINE ENGINEERING—THE DIFFERENCE IN PROPELLERS—A KNOWLEDGE OF CHEMISTRY IS USEFUL.

Prof. J. H. Biles delivered a lecture recently before the Glasgow and West of Scotland Technical College Scientific Society upon the subject "The Education of a Ship Builder." After a few introductory remarks as to the meaning of education, he said:

"One of the first things which go to make up the education of a ship builder is that nothing should go into a ship which cannot earn a dividend. Let us apply this to a case which all can understand. Suppose a vessel is classed at Lloyd's or the British Corporation, and a ship builder or ship owner desires to double the sheer strake, that is, to make the top strake of plating in a ship double the thickness which is prescribed at Lloyd's. This can only be done by an additional first cost, and frequently by a reduced earning power. The desirability of fitting such an extra amount of strength must depend upon whether at some time in the vessel's life she will be so strained as to necessitate the spending upon her of more than the sum represented by the first cost of the extra plate, the loss of earning power up to the time that she is strained, and the interest on these two sums. Can such a problem receive an exact solution? If it can, obviously the power to solve such a problem is a very necessary item in the education of a ship builder. This, however, is a question which affects the design of a ship, and depends primarily upon a knowledge of the strength which is required in a ship to resist the action of the forces which are brought to bear upon her by the sea. This subject is a large one, and involves a knowledge of the principles of and the observations upon the strength of materials, and also of the best method of combining the parts of a structure so as to give the necessary resistance to the forces that act upon it. It also involves a knowledge of the forces which bring stresses upon a ship, and the distribution of these stresses throughout a ship. This simple instance of the double-sheer strake is one of hundreds in which fuller knowledge means more earnings, because there is a loss in first cost, and in money-earning power in every unnecessary ton of material put into a ship. Of course, it is very easy to be safe for the moment and to put more rather than less material into a ship. This is probably a more general practice than would usually be admitted to be the case, and it is difficult to see how it can be otherwise while such organizations as classification societies fix the minimum of scantlings for every part of the ship. Under such a system no one can attempt to make lighter any part of a ship which he thinks or knows is too strong, and the education necessary to determine practically the actual strength of a ship by reducing their unnecessarily strong parts to the sufficiently strong amount is in most cases attainable. Let us turn to another instance in which the money-earning may be affected by the knowledge of the ship builder. Every steamer requires a certain power to propel her at her desired speed, and this power is largely determined by the form of the ship. Any change in form which (while fulfilling all the necessary conditions) admits of a reduced power necessarily increases the earning power of a ship and also her first cost. Every horse-power saved means about four tons of coal per year, and as this coal is not only not bought, but is not carried, it means an ability to carry four tons more cargo per year. Most of the vessels afloat have horse-power from 2000 to 4000, so that even one per cent. of this means an appreciable increase to the money-earning power of the ship. There is also the saving on first cost to be taken into account.

ELEMENTS OF PRODUCTION IN SHIP BUILDING.

"What are elements of production in a ship building business? First, let us consider what is to be produced, and then let us consider the economical ways of producing it. A ship is a steel structure which must be capable of crossing the seas in all weathers. If she is a mercantile vessel she must do so with as great a revenue-paying cargo as possible and with a minimum of expense for transportation. In the cost for transportation must be included interest on first cost, depreciation in value of ship, and insurance of value against loss. Hence first cost enters into the expense of running a vessel. If the vessel is a non-revenue-earning ship, such as a warship, first cost is almost the only consideration with a ship builder, but he has always to give his attention to the question of how the work of running a ship can be done with the least possible expense both for actual working expenses and for cost of repair and maintenance. The steel structure of the ship is made from material which is rolled in the steel works, its first cost being paid by the ship builder, but only in a small degree is he able to affect the cost of production of the steel. He may, by so modifying his structure, make the work of the steel manufacturer more or less costly. For instance, he may in the design of his structure introduce sections whose form is difficult to roll. He should, therefore, be familiar with the processes of steel manufacture, though he may not be necessarily an expert steel maker. In a warship design a very full knowledge of the capabilities of steel manufacture, especially in the armor-producing department, is necessary. It is, however, in the matter of fixing the sizes and arrangement of the parts of the steel structure that a ship builder is most likely to influence the cost of his productions. The structure has to be treated as a whole. Frequently in a structure it happens that material which is meant for one purpose may serve other purposes. Take, for example, the case of a transverse water-tight bulkhead. Generally it is put in to subdivide the vessel, so that in case of damage by collision or otherwise the amount of water which enters the ship shall be limited. This purpose is one which rarely, if ever, the bulkhead fulfils, because the ship seldom gets flooded by collision or otherwise. In some ships, for instance sailing ships, there are no such bulkheads except perhaps one forward. In others the number is great, being as large as seven-

teen in some of our large Atlantic liners. The number of bulkheads is determined by the consideration of the amount of flooding which is desired to be provided against, the amount being one which does not endanger the safety of the vessel. But these water-tight bulkheads, though they may never be called upon to fulfil their original intention, can be, and generally are, made use of to add to the structural strength of the vessel. They form one of the greatest means of resistance to change of form when a vessel is rolling, and one would naturally expect that any vessels which have a large number of bulkheads, preventing change of form when rolling, would be made less strong in other parts of the vessel in consequence of the increased number of bulkheads. The educated ship builder should know how and where to make such allowance. This is only one instance of many of the same kind where material is introduced in the structure for one purpose, but it may serve more than one, and thereby cause a reduction to be made in other parts of the structure where material has been rendered unnecessary or excessive by the introduction of some for another purpose in another way.

THE VALUE OF IRON DECKS.

"At one time ships had only wooden decks, even in iron vessels. With the increase of size of the vessel it became desirable and necessary to have complete iron decks. The object of the wooden deck—the formation of a platform to walk upon—can be fulfilled by the iron deck the moment that deck is made a complete one. The iron deck, when complete, fulfilled the double purpose of giving the necessary strength to the structure and forming the platform which had previously been formed by a wooden deck, and the weight of the wooden deck ought to be saved. In the design of the structure of a ship the ship builder must be able to estimate or judge the effect upon the strength of the structure of variations in arrangement from ship to ship, so that he may be able to take advantage of changes which have been made for other than strength purposes, but which add to the strength, in order to reduce the weight of his structure, always, of course, retaining the strength necessary for the purpose of the ship. The design of structure also naturally affects the cost of putting the structure together, which structure, if made in too many pieces, will cause the work of connecting these parts to add to the cost of the vessel; while if it is made in too few pieces the parts cannot be economically handled or will involve the use of plant of too expensive a nature for profitable production. Experience often teaches the sizes of different parts of structure as far as these two last-named considerations go, but a knowledge of the limitations of the steel manufactures in regard to sizes is a necessary part of a ship builder's education, as well as a knowledge of the limitations of ship yard plants. Here we find two things clashing with each other, each very important in the economical production of a ship. On the one hand, the extra cost of workmanship due to having to get a larger number of parts together; on the other hand, the extra cost of machinery or plant (or rather the interest upon the depreciation of the extra cost of the plant) to enable larger pieces to be handled. This is a matter for estimating, but there is evidently a strong inducement to reduce the cost of workmanship by the adoption of machinery, when one remembers what has been already stated that one man's wages is equivalent to the interest on £1000 of capital. It is also to be remarked that, in addition to the saving on the cost of workmanship, there is generally an increased output, due to the reduced time which the work takes to do. Take the case of outside plating. Twenty years ago 12 ft. by 4 ft. was about the normal maximum size of plating. Such a plate would weigh a little more than five-eighths of a ton and it could be transported on a light barrow and hoisted by plating tackle by the men who were necessary to mark it and punch it. Plates are not uncommon now of more than double this length, and of breadth nearly half as much again, and of a weight of quite three times. The number of rivets per ton weight of plate is one-fourth less in the large plate than in the small one. But the adoption of such plates involves power cranes, iron railways, and much heavier plant generally. Instead, however, of being able to turn out a ton of ship building we should now be able with the same amount of workmanship and this improved plant to turn out more than one and a third tons, a gain of 33 per cent. in output. It is evident that there will be some point at which increase of plant cannot be economically adopted, or where increase of plant cannot be associated with increase of size of pieces which go to make up the structure because of the limitations which the steel manufacturer has placed upon him.

EDUCATION MUST INCLUDE A KNOWLEDGE OF MACHINERY.

"Here we see, then, the education of the ship builder necessarily includes knowledge of the use of machinery, both as it exists and as it may be improved, as well as the knowledge of the cost of workmanship under existing and under the improved conditions. The same kind of considerations apply to a great many parts of the structure and equipment of the ship. There is also the simpler question of the direct displacement of manual labor by machine labor to do the same work, because of its greater rapidity and its less cost. Mechanical drilling, caulking, riveting are objects for the application of the results of education in mechanical engineering. Not only is it necessary for the mechanical engineer to know something of the structure of ships, in order that he should construct tools for improved economy and efficiency in the manufacture, but the ship builder has to make himself familiar with the methods of the mechanical engineer in order that he may suggest to him the kind of tool that he wants and the method of overcoming the difficulty that he has to face. He has to be familiar, in other words, with the theory and practice of machines. A ship's structure cannot be made without machines. The type of the machine is determined by the structure, and the structure depends upon the machines that are to make it, so that these two things act and react upon each other, and the ship builder has to be familiar with the science of the arrangement of the ship's structure so that it shall do the work that it is intended to do, and he has to be familiar with the science of machinery which is to make the structure. The cost of production depends upon the design of the structure and upon the method of putting it together. The design is molded by the ship builder to fulfil the two requirements—(1) What the structure has to do, and (2) how it is to be put together. Of course, there are a great many things that go to make up the cost of a ship which do not contribute to the main structural strength. In fact, many of them will involve a greater strength of structure than would be necessary without them. For instance, the main engines and boilers add considerably to the weight of a ship, and require a

great amount of extra structure to support them, and the engines when not properly balanced cause considerable vibration in a ship, and seriously try the workmanship. It goes without saying that a ship builder must be acquainted with the general arrangements of machinery. Of course, many ship builders are marine engineers as well. There is no reason why this practice should not become general. There is nothing in the scope of the science of naval architecture or marine engineering which should prevent a man from having a knowledge of both. The machinery and the hull are parts of a great whole, each adapted for the use of the other—the machinery to drive the ship, and the ship to carry the machinery. In high-speed vessels the machinery is the most important component part of the structure, but in vessels that are usually called 'tramps' its importance is less. It does not tend to embarrass a ship builder so much as in highly-powered vessels, where frequently it is so all-pervading that the boilers bulge the bottom out, while the funnels reach to the clouds. The coal bunkers extend from the fore-peak to the stuffing box bulkhead, and the engines fasten themselves on the backbone of the ship, and waggle the two ends about their revolving cranks. The ubiquitous moisture escaping from the steam joints of the machinery corrodes more or less all parts of a ship, so we see that it is impossible for a ship builder to construct a high-speed steamer without a very intimate knowledge of marine engineering.

A KNOWLEDGE OF CHEMISTRY IS USEFUL.

"The prevention of corrosion is one of the subjects in which the ship builder's knowledge of chemistry may serve him in good stead. Whether red lead, iron oxide, or bitumastic paint best serves the purpose of preserving the inside of a steel ship, is a subject which may well engage the attention and observing powers of a ship builder with a knowledge of chemistry and the chemist who takes an interest in a ship. If no provision had to be made for corrosion many parts of the structure might initially be made lighter, with the consequent economy in first cost and increased weight carrying which follow. On the other hand, possibly too little money has been spent in examination and opening up the internal part of the steel structure after the ship has come into the possession of the ship owner. A constant watching of the part liable to corrosion and a frequent repairing may in many cases be consistent with a reduced thickness of various parts of the ship.

"I have already touched upon the question of gain in money-earning capability due to reducing the engine-power necessary to obtain a required speed. This, we know, depends partly on displacement or weight of ship. The latter, for a given weight carried, depends upon what we have already discussed—weight of structure. The former depends upon the knowledge of the ship builder of the subject of resistance of ships. This knowledge may be gained by experience or experiments in a tank, or it may be gained by experience (which is also experimental) in full-sized ships, or it may be by both. Carefully-conducted progressive trials upon the measured mile related to carefully-recorded results of sea voyages form the basis for determining the power required to propel a required ship at a chosen speed. They also serve the purpose of carrying out experiments which thought and observation suggest, with a view to improving efficiency, or, in other words, reducing horse power and increasing money-earning capability. Wrapped up in this subject of resistance due to form is that equally subtle one of the efficiency of the propeller.

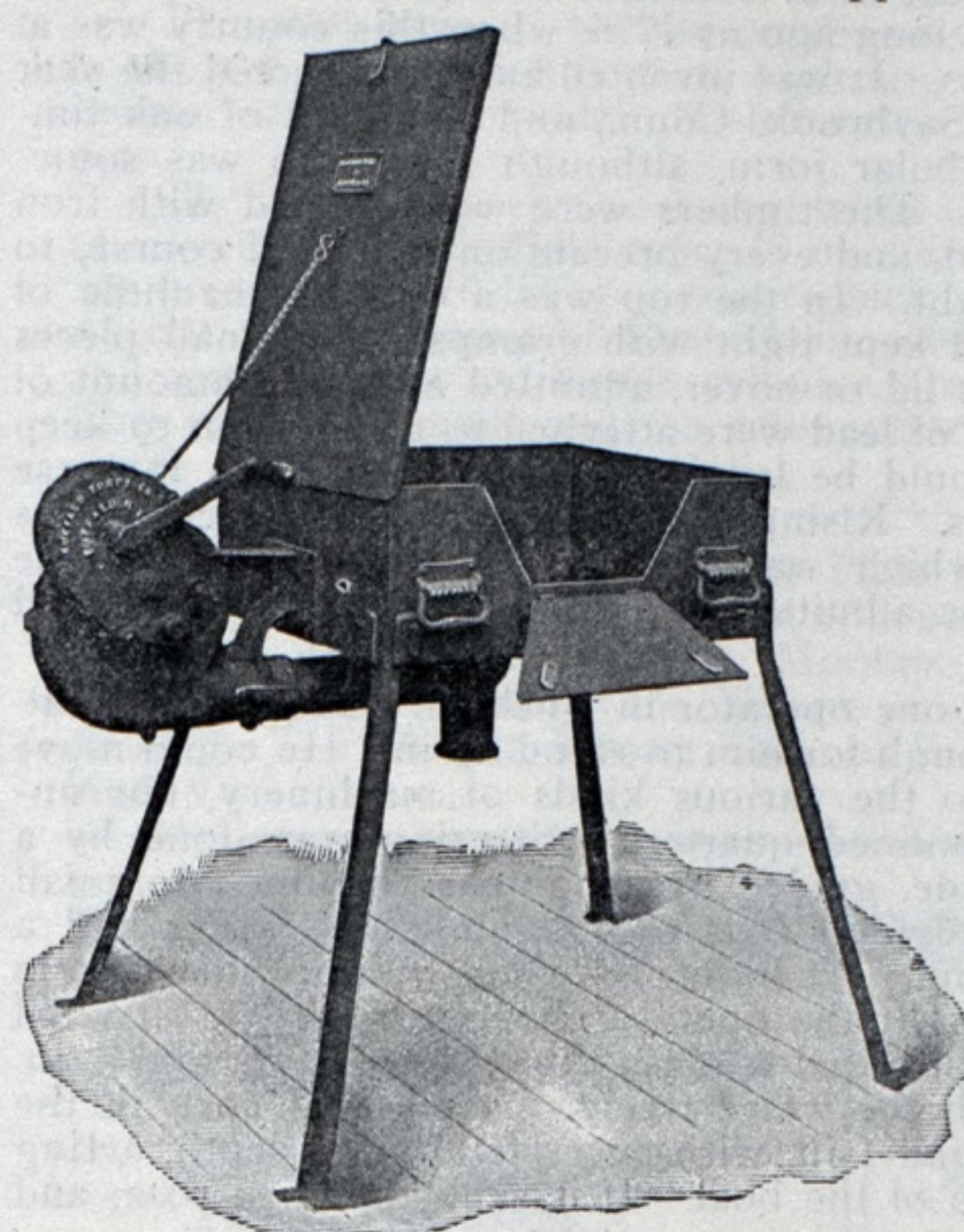
ADVANTAGE OF THE BRASS PROPELLER.

"The difference between economic success and economic failure has often been entirely due to the propeller. It may not be uninteresting to relate to you what happened at the respective trial trips of two sister vessels which were in their day the holders of the speed records in their particular line. One was tried with a set of propellers of the orthodox cast-steel, blunt-edged, thick-rooted, rough type of the 1870-80 period. A speed of something under 20 knots was obtained in this vessel—not a bad speed in those days, but not sufficient to satisfy the desires of those interested in the ship. The second vessel was supplied with a much more genteel propeller—one of the up-to-date type—brass (brazen, one might almost call it), sharp, keen, smooth, elastic. On the trial the speed which had been obtained with difficulty in the first vessel was exceeded by two knots with the greatest ease in the second vessel. The power lost somewhere in the first vessel was 20 per cent. of the total power. This is not a small economy, but one which would make all the difference between success and failure. It is needless to say that the propellers of the first vessel were very promptly changed, and the two vessels carried out fully the original intentions of their projectors. I need hardly say much about the many precautions which the education of a ship builder prompt him to take to ensure that the vessel produced shall be what he intends her to be. He carefully studies the subject of stability, not that he attaches a direct money value to so much stability, but in order that the vessel shall not give trouble and annoyance to those who have to handle her by being short of stability, nor shall she get a bad name as a seaboat because she has too much stability. Her reputation is that of her builders, and he is careful to avoid any reflection being cast upon either. He also carefully studies how he can arrange his ship so that the omniscient government official shall not have reason to find fault, and so that no more space than is absolutely necessary shall be measured for tonnage, because it is upon this tonnage the ship owner is taxed, and in this respect he and the ship owner are hand-in-glove. Some very well educated ship builders have even been known to make a special study of the subject of reduction of net tonnage with a view to saving the due payment of rates, but it is not desirable to appear to be too studious in this matter, or one is apt to be open to the suspicion of a slight leaning in the direction of what has been called 'tonnage cheating.'"

Transfers of vessel property: Steamer Kate Buttironi from Mrs. Kate Norton of Marine City to Cleveland-Cliffs Iron Co. of Cleveland; schooner Fannie Neil from Bigelow Bros. of Chicago to Kelly Island Lime & Transport Co. of Cleveland; steamer Wm. Rudolph from C. Reiss Coal Co. of Sheboygan, Wis., to A. F. Temple of Muskegon, Mich.; schooner Grace G. Gribbie from Emery D. Wemier and Capt. M. Shomer of Ludington, Mich., to H. G. Beck and others of Cleveland; tug George Pankratz and two large scows from Pankratz Lumber Co. of Sturgeon Bay, Wis., to Gaynor Bros. of Sandusky, O.

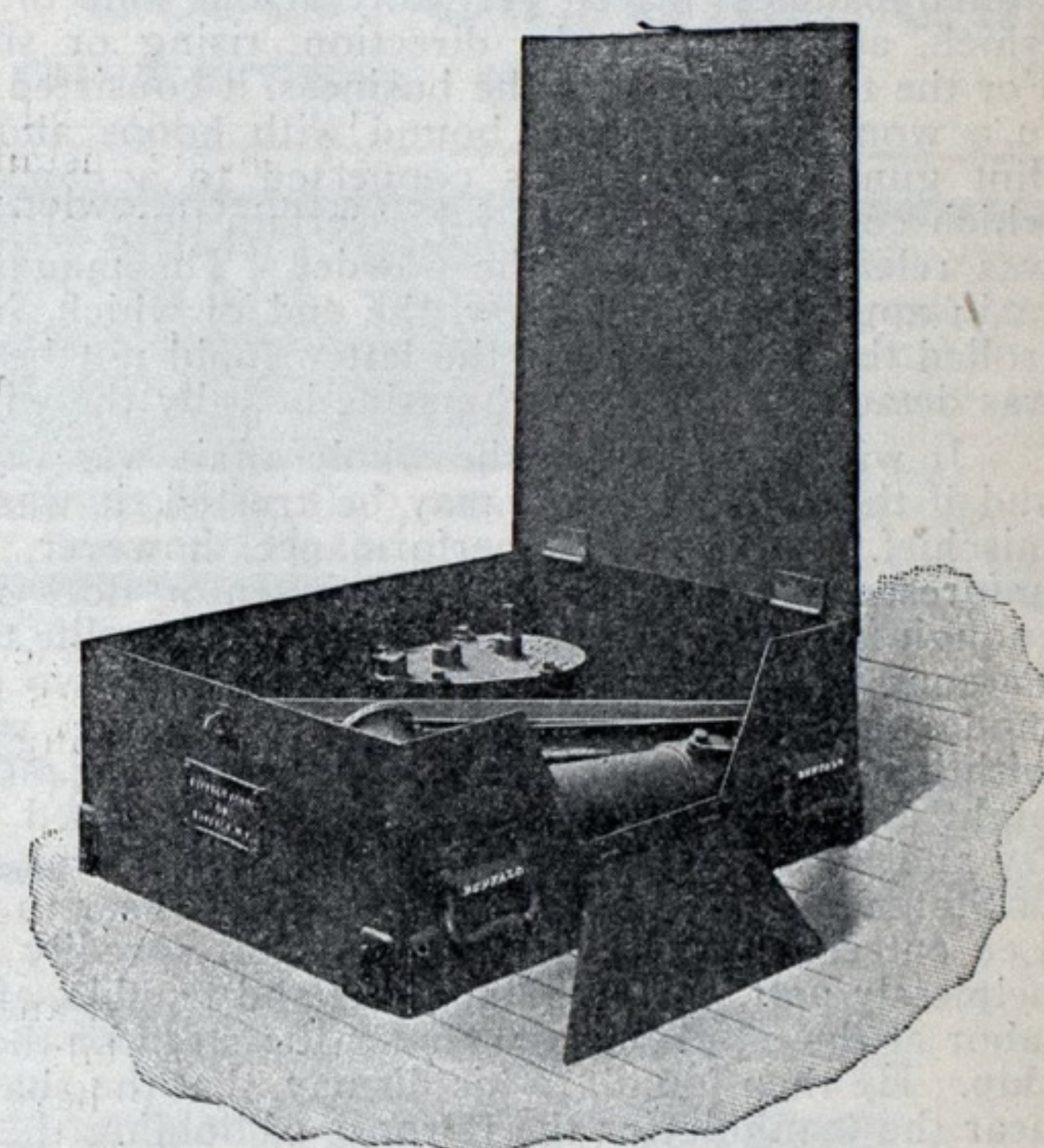
NOVEL FOLDING FORGE.

In order to supply the rapidly-increasing demand for a forge of minimum compass and weight, the Buffalo Forge Co. of Buffalo, N. Y., has recently placed upon the market an apparatus of this nature, which embodies many novel features.

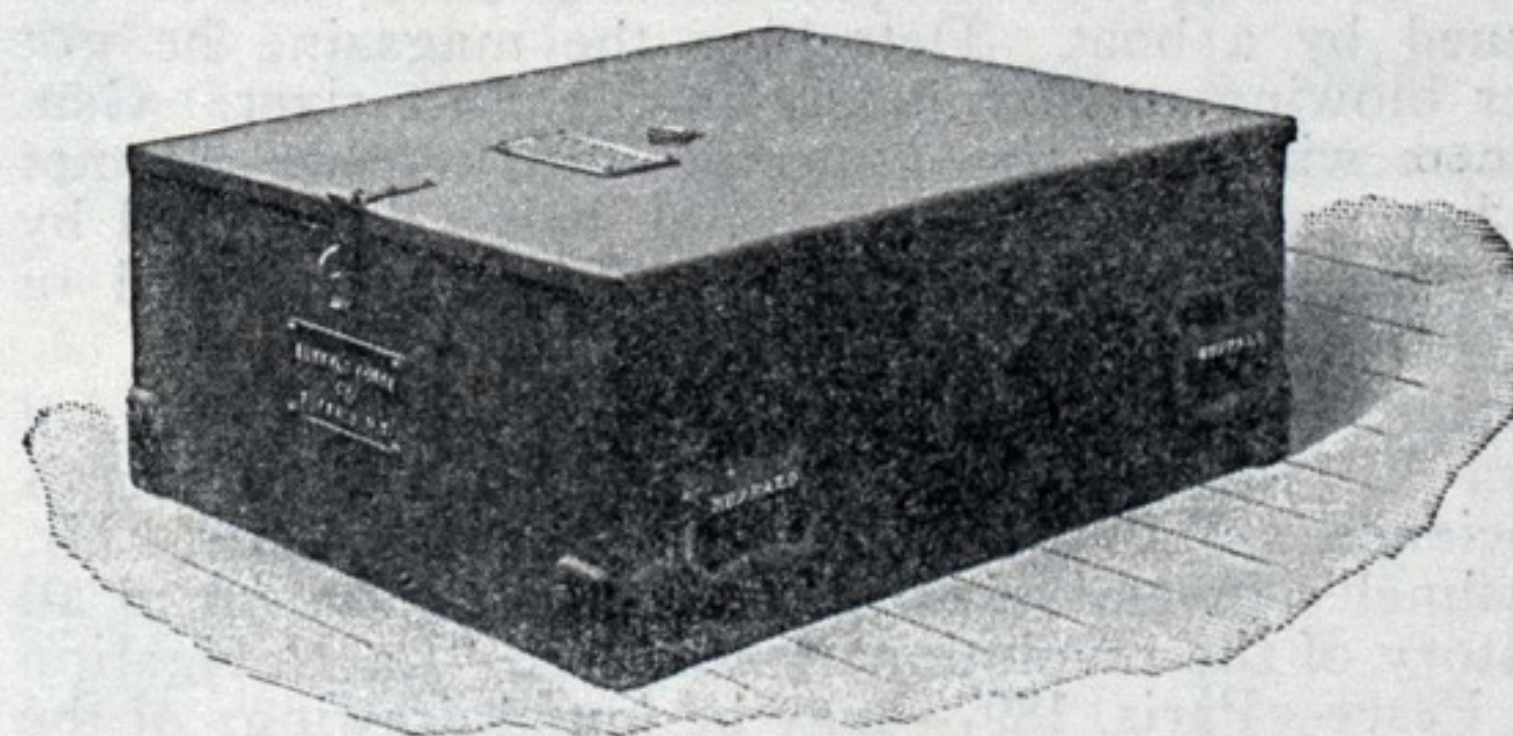


FORGE ASSEMBLED READY FOR USE.

The characteristics referred to will be readily understood by a glance at the three illustrations herewith presented. The first view shows the forge as it appears when set up ready for use. The rigid steel plate case provides a commodious hearth for the fire, which stands about 30 in. above the ground. To the case are removably attached the various parts, gearing, blower, tuyere and legs. The latter fit into sockets at each corner of the case, and at their lower end are flanged horizontally to provide feet for support, as indicated in the first view. An 8-in. crank and handle communicates the proper speed of rotation to the blast wheel of the blower through a train of four accurately cut gears, enclosed in a dust proof case. The rotary blower, of ample size for the forge, is connected to the orifices in the circular tuyere plate by means of the tuyere pipe, which is formed with a short drop branch for the collection of ash. To facilitate the handling of long bars, a section on each side of the case is hinged so that it may be turned down. It will thus be seen that all points entering into the design of a first-class forge have been considered. When assembled, with the cover raised to act as a wind shield, the forge, as suggested, combines utility with efficiency and capacity.



PARTS DETACHED AND PLACED IN CASE.



PACKED IN CASE FOR TRANSPORTATION.

As indicated in the second view, the several parts—gearing and blower, tuyere pipes, legs and crank—may be detached and readily packed within the case, leaving in addition sufficient space for blacksmith or farriers' tools. The third view shows the forge in its most compact form, as it appears when ready for shipping or storage. This also is the form taken on shipboard when not in use. The outside dimensions of the closed case are but 27½x22½x10 in. and the weight of the complete outfit is only 164 lbs. It must be admitted that this is an extraordinarily small compass in which to pack so bulky a machine as a forge. A hasp provides means for padlocking, and four handles, two on each side, make easy lifting a possibility. In addition, the construction is such that the forge may be assembled for use in three minutes.

This forge is already in extensive use, though by no means exclusively on shipboard. In addition to the sales in this country, it has been introduced abroad. It is in use in the Imperial Japanese navy. It has been recommended for army use by the quartermaster of the United States army, as it is just the thing for transportation on mule back, or for compact storage and shipping. Miners, prospectors, bridge builders and railroad contractors will appreciate fully the great convenience of this type of forge.

EARLY SUBMARINE WARFARE.

From the Engineer, London.

Some account of early attempts at building submarine vessels for war purposes may be interesting just now. The first of which we can find any detailed account was made so long ago as 1776, when this country was at war with its American colonies. It was invented and constructed the year before by David Bushnell of Saybrook, Conn., and was built of oak timbers or staves, in almost globular form, although the depth was somewhat greater than the width. The timbers were well hooped with iron bands, seams carefully caulked, and every precaution taken, of course, to render the machine water tight. In the top was a circular manhole of metal, hinged at one side and kept tight with cramps. Six small pieces of thick glass, inserted in this lid or cover, admitted a certain amount of light. Seven hundred pounds of lead were attached to the bottom to keep it upright; of this 200 lbs. could be let go if it was desired to increase the buoyancy of the apparatus. Rising was effected by two force pumps for driving out the water which was apparently taken down on the descent, whilst more could be admitted through a spring valve worked by the foot for sinking.

There was only room for one operator in Bushnell's submarine boat, which was just about deep enough for him to stand up in. He could move about sufficiently to attend to the various kinds of machinery, but undoubtedly had remarkably confined quarters. Steering was done by a little fin-like rudder at one side, guided by a compass having two small pieces of phosphorescent deadwood crosswise upon its N. point and a single piece at the opposite end. At night, or when the machine was in deep water, this was all the light the operator had to work by. To tell how deep down he was he consulted a glass tube, 12 in. long and 4 in. diameter, communicating with the water freely. A piece of cork in the tube was estimated to rise or fall 1 in. with every fathom of depth, acting the reverse way to the motion of the boat. If it sank the cork rose, and vice versa.

As for the all-important matter of moving power, it consisted of two oars or paddles, rather like the sails of a windmill, fixed screw-wise upon the end of a shaft which passed through the side opposite to the rudder. They were but 12 in. long by 4 in. wide, but by grinding away very energetically at the cranked handle inside, a rate of about three miles an hour could be obtained in still water. There are said to have been two other similar paddles, placed vertically at one side of the manhole, by turning which, according to the direction, rising or sinking could be assisted. For the torpedo part of the business, it consisted of 130 lbs. of gunpowder in a wooden receptacle, bound with hoops and fitted with an ordinary flint gunlock. This was connected to a clock or alarm arrangement, which could be set to go for a certain time, at the end of which the lock was released and fired the powder. The magazine was attached to the main apparatus by a screw, the end of which, inside the magazine, controlled the clock, so that the latter could not be started till the magazine was detached from the submarine boat by the withdrawal of the screw.

It will be seen that the whole affair was very carefully thought out, and if the accounts of it may be trusted, it was easily capable of doing mischief. As to actual performance, however, it failed through several unforeseen contingencies. The inventor does not seem to have had enough faith in his creation to trust his own life to it, as he requested Gen. Parsons of the American army to send him two or three men to learn the mode of working the machine. These men made several experiments with it in and about Long Island sound, and on a suitably quiet and still night arriving, one of them, a sergeant named Ezra Lee volunteered to try and blow up one of the British men-of-war lying near the north end of Staten island. Having been rowed as near to them as was judged safe, Lee entered the submarine vessel, but speedily found the tide drew him helplessly past. With great pains and trouble, after two and a half hours' labor at the crank, he got under the stern of the Eagle, a sixty-four-gun ship. He then found, to his dismay, that the sharp screw which projected near the manhole for the purpose of holding the apparatus steady against the object to be blown up, whilst the magazine could be attached to this screw on its being left sticking in, could not be driven in firmly enough. The vessel's bottom was too hard, or the force too small, and at each trial the machine merely rebounded, having failed to get any hold. One or two more attempts were made at different parts of the vessel's bottom, but it was now getting light, and for fear of being seen, so little beneath the surface of the water, he let the tide carry him off. Before landing Lee had to look out frequently from the top, his compass having failed, and in this he was seen and pursued by a boat. Detaching the magazine he got ashore safely, the latter blowing up harmlessly in the East river. Gen. Putnam and other officers witnessed the explosion. In another attempt made a few days later Lee was equally unsuccessful, being discovered by the ship's crew. After this little more appears to have been heard of Bushnell's torpedo or his submarine boat experiments.

The facts just narrated were supplied to a Mr. Charles Griswold, of Lyme, Conn., by Ezra Lee himself, and communicated to Silliman's American Journal of Science, vol. ii., in a letter dated Feb. 21, 1820. Mr. Griswold speaks of Bushnell's invention as being then well known to all acquainted with the history of the revolutionary war. In "La Navigation Sousmarine," by G. L. Pesce—Paris, 1897—may be found drawings of the apparatus, constructed from the above and some additional information. From the latter it seems that the mountings of the thermometer, compass, and other instruments Sergeant Lee may—or may not—have had with him were covered with a composition of phosphorus, to enable him to read them. There were also two reservoirs which could be filled with fresh air through a ventilator when the machine rose to the surface. M. Pesce further states that Bushnell made an attempt in 1777 against the frigate Cerberus, and another on the English fleet at Philadelphia, without success. From this he was led to contrive strings of boxes filled with powder and allowed to drift against the object marked for destruction. We have never heard, however, that our fleet suffered any harm—in that war, at any rate—from any such system of torpedo manipulation.

It is well established that Robert Fulton, called by Americans the inventor of steam navigation, devised a submarine boat with which to destroy ships, piers, etc. He was living in France when, in 1797, he submitted his vessel to the approval of the government of the directory. They would have nothing to do with him, but in 1801, under the consulate, Fulton was allowed to try experiments at Havre, Rouen and in the road-

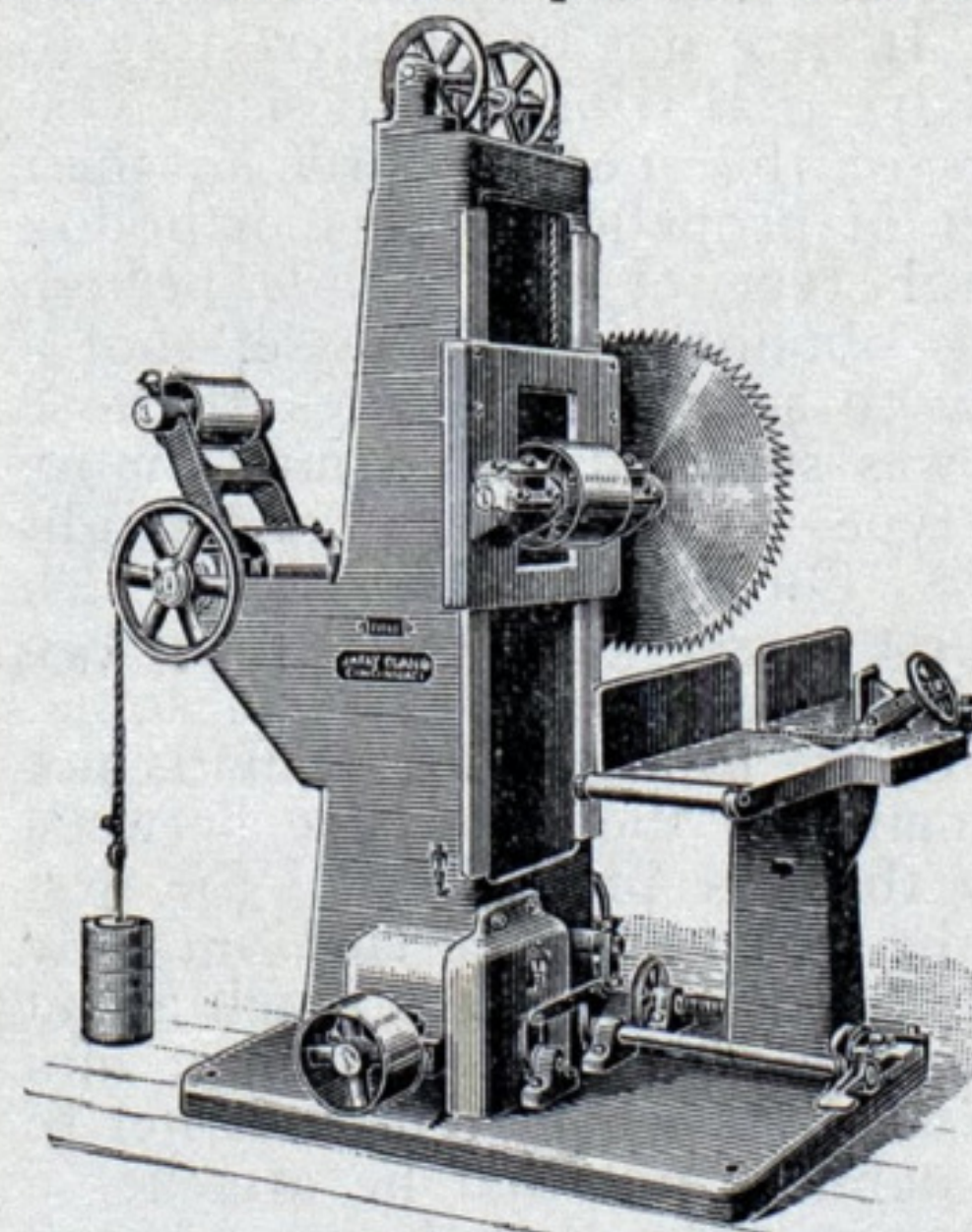
stead of Brest. The craft was called the Nautilus. It had a hinged mast for sailing till the time for submergency arrived. With three companions Fulton remained below water in Brest harbor, on July 3, 1801, for an hour, at 25 ft. from the surface. It does not appear how the supply of air was kept up, but on another occasion he stayed at 5 ft. depth, also with three persons, for 4½ hours by the aid of a copper globe of 1 cu. ft. capacity, "containing 200 atmospheres." On the first descent they were in total darkness, but afterwards a small pane of glass was inserted. Two of the crew working at a "propelling engine" moved the craft at the rate of 2½ miles per hour, a third man steered, and Fulton himself attended to the level at which he wished to be.

Although Fulton was well acquainted with what Bushnell had done before him, he seems to have preferred the system of floating torpedoes down to the object to be attacked, guiding and even exploding them by means of lines, to that of carrying them by a submarine vessel to the point where they were to be used. This he developed to a high degree and conducted explosions in France, England and America with great success. Large copper cylinders, fitted with a flint gun lock, were used, clock-work being set in motion by the withdrawal of a peg and acting upon the lock after a certain interval, usually 15 minutes. Another arrangement was that the triggers would be worked by levers actuated by contact with the object of attack. A curious picture of the destruction of the brig Dorothea off Deal, by means of a torpedo on Oct. 15, 1805, may be found in Fulton's "Torpedo War and Submarine Explosions," published in New York in 1810. Vessels in motion seem to have been outside the range of his operations, the favorite idea being to let the line attached to the torpedo catch against the mooring chain and thus let the tide or current swing the infernal machine under the vessel's bottom. The submarine boat in fact seems to have been, with Fulton, designed subsequently to and as a possible adjunct to the torpedo.

A singular attempt at submarine warfare seems to have been made by the brothers Coessin, who in 1809 constructed a vessel at Havre under the patronage of Napoleon. Like Fulton's it was called the Nautilus. In shape it was practically a wooden cask, 12 ft. long by 9 ft. diameter, but the pointed ends made the total length 27 ft. The interior had three compartments, of which the central one had also a dividing floor. If these dimensions are correct only remarkably small people would have been able to stand up. For sinking, water was admitted to the conical end, aided by plenty of lead ballast, whilst to rise this water was intended to be driven out by air forced in by two large bellows. A couple of little vertical fins or paddles, folding either way, assisted these movements; two others, of the same type but larger, projecting through port holes fitted with leather pouches to keep out the water, furnishing propulsion below the surface. There was a lowering mast for sailing. The inventors do not seem to have intended to use explosives but hoped to set ships on fire by quietly attaching large cloths covered with sulphur under the poop, or quarter. Besides the very doubtful utility of this principle the machine had great defects. It would only go at the rate of 1½ miles an hour under water, carrying nine men, and communication with the atmosphere was necessary for driving out the water ballast in order to rise. It does not appear ever to have answered any useful purpose.

FAY & EGAN CUT-OFF SAW AND GAINER.

A new and improved machine, known to the manufactures, J. A. Fay & Egan Co., as No. 8 vertical cut-off saw and gainer, is shown in the small illustration presented herewith. This machine should prove interesting to the heads of car works, ship



yards, bridge building establishments, etc., engaged in cutting off and gaining large timber. It will carry a saw 40 in. in diameter, cut off material 13 in. square, or 26 by 1 in. thick, and when proper gaining head is used will cut a gain 6 in. wide and 1½ in. deep, and expands from 3 to 6 in. wide. The column is heavy, cored and bolted throughout, and has large base, preventing vibration.

The feed raising arbor consists of frictions operating on two large screws resting on ball bearings, nuts being fitted to take up all wear. The arbor is easily adjusted, controlled by treadle convenient to operator, and the travel regulated by adjustable stops. The table is mounted on a stand, adjustable to and from the arbor, and can be swung to an angle of 30°. It has friction rolls on each side, and suitable screw clamp is provided for holding the material. The machine can be belted either from the top or below, the swinging idler being reversible to bring the weight into action for either position.

The manufacturers, J. A. Fay & Egan Co., Nos. 325 to 345 West Front street, Cincinnati, will be pleased to furnish full particulars and lowest prices on application, and will also send their large new illustrated hanger free.

"WITH CHRIST AT SEA."

Under the above title, Frank T. Bullen recounts his personal experiences as a christian amongst those who "go down to the sea in ships." Necessarily there is much of Mr. Bullen in the book, but it gains rather than loses thereby. To have made it in the third person would have greatly weakened the contrast—a pleasing feature—constantly present between a God-serving seafaring man and those who, in any view, are quite the opposite. The face to face encounters with the trials of such life in merchant ships, in sailor haunts ashore, the petty annoyances to which one may be subjected by officers; the hardships imposed by the indifference of owners, gives it an intense human interest. It is by no means a sermon. It has much of the sea's fascination, which Mr. Bullen knows so well, and is well worth reading by churchman and layman, seaman and landsman. There is much of life in it, and the pictures of sea life are vivid.

STEEL BARGE BUILT AT WILMINGTON.

Wilmington, Del., Feb. 19.—Another steel barge (No. 6) for the Rockland & Rockport Lime Co. of Bangor, Me., was launched Saturday at the works of the Pusey & Jones Co. The river was full of floating ice, but the launch was highly successful. The principal dimensions of this barge are: Length between perpendiculars, 187 ft.; length over all on deck, 194 ft.; beam, molded, 38 ft.; depth, molded, 17 ft.; sheer, forward, 3 ft.; sheer, aft, 1 ft. 6 in. The frames are made of bulb angles, 6x3 in. by 12 lbs., and are spaced 24 in. apart. The outside plating runs in weight from 15 to 17 lbs. It is lap-jointed on all the butts except in the sheer strake, where it is butt-strapped. All of the landings are double riveted. The flat keel is formed of plates 30 in. wide by 20 lbs. A continuous middle line keelson 30 in. deep runs throughout the ship. It is connected to the outer skin by double continuous angles 4x3 in. by 8½ lbs. A flanged stringer plate 9 in. wide by 14 lbs. is fitted onto the top of high floors on each side of center keelson and connected to keelson and floors. On top of the center keelson double continuous angles 4x3 in. by 8½ lbs. are riveted back to back. A midway and intercostal keelson, 12½-lb. plate, flanged next to the skin, is fitted and connected to each

The Marine Review wants a representative in every city on the Great Lakes.

Sealed proposals will be received at the office of the Light-house Engineer, Detroit, Mich., until 12 o'clock M., March 14, 1901, and then opened, for furnishing the material and labor of all kinds necessary for the erection of a combined light tower and fog signal house on the South Pier at entrance to Duluth Harbor, Minn., in accordance with specifications, copies of which, with blank proposals and other information may be had upon application to Major Thos. H. Handbury, Corps of Engineers, U. S. A. Feb. 28.

U. S. Engineer Office, 1637 Indiana Ave., Chicago, Ill., February 4, 1901. Sealed proposals for dredging in Chicago Harbor will be received until 12 noon, central time, March 12, 1901, and then publicly opened. Information furnished on application. J. H. Willard, Maj., Engrs. Feb. 28.

U. S. Engineer Office, St. Augustine, Fla., Jan. 26, 1901. Sealed proposals for building and equipping a steel hull, stern wheel, combined dredge and snagboat will be received here until 12 noon, Mar. 7, 1901, and then publicly opened. Information furnished on application. C. H. McKinstry, Capt., Engrs. Feb. 21.

floor to the shell plating. The top of this keelson extends high enough above the floors to enable its being fastened between double continuous angles 4x3 in. by 8½ lbs. The main deck plating is 12½ in. wide by 11 lbs. The forecastle deck plating is 12½ lbs.

The pilot house is located on the after end of the forecastle deck and is about 8 ft. square, 6 ft. 6 in. high and of 10-lb. steel plate. The living quarters are placed under the forecastle deck and are arranged for five men.

The machinery of this barge takes up very little space and consists of a boiler of the upright type, 48 in. diameter by 9 ft. high, with a working pressure of 110 lbs. per square inch; a duplex donkey pump 5¼x3½ x5 in.; a bilge pump of 10x6x10 in. with 6-in. galvanized suction pipes and four Lidgerwood single cylinder, single-drum type hoisting engines. This vessel was built under a sub-contract from the Harlan & Hollingsworth Co. of Wilmington, Del.

Settlers' rates via the Nickel Plate road—Beginning with Tuesday, Feb. 12, low rate settlers' tickets will be on sale every Tuesday to and including April 30, to Oregon, Montana, Washington and all points in the Northwest. Write, wire, 'phone or call on the nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O. 10 April 30.

"Seaboard Steel Castings."

MANUFACTURERS OF
"THE ADMIRAL" ANCHOR.

THE LATEST AND BEST
STOCKLESS ANCHOR.

APPROVED BY LLOYD'S.

ANCHORS CAST AND TESTED ON
ORDER, OR STOCK ORDERS
PROMPTLY FILLED.

A GUARANTEE OF QUALITY.

OPEN-HEARTH STEEL CASTINGS
OF THE HIGHEST GRADE.

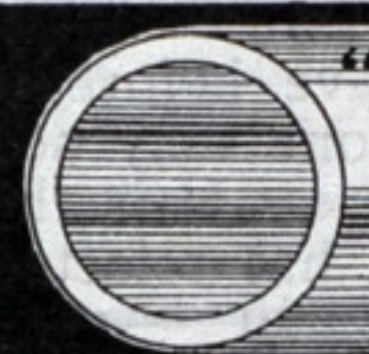
FACILITIES FOR CASTINGS UP TO
80,000 POUNDS WEIGHT.

MACHINE WORK AND PATTERNS
FURNISHED WHEN REQUIRED.

RAIL OR WATER DELIVERIES.

CAPACITY, 1500 TONS PER MONTH.

Seaboard Steel Casting Co.,
CHESTER, PA.



"BENEDICT-NICKEL" SEAMLESS TUBING

FOR CONDENSER TUBES

Contains NO ZINC nor any weakening metal.

Send for Booklet with treatise on "Electrolysis of Condenser Tubes."

Benedict & Burnham Mfg. Co., Mills and Offices, Waterbury Conn.
New York, 253 Bd'wy. Boston, 172 High St. Chicago, Cor. Lake & Clark Sts.

BELLEVILLE GENERATORS

Grand Prix 1889
Originated 1849

Hors Concours 1900
Latest Improvements 1896

Number of Marine Leagues made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australian	Polynisien	Armand Behic	Ville de la Ciotat	Ernest Simons	Chili	Cordillere	Laos	Indus	Tonkin	Annam
1890.....	22,576	820									
1891.....	22,749	22,777	68								
1892.....	22,749	22,801	23,274	7,753							
1893.....	22,793	22,781	22,762	22,749							
1894.....	22,813	22,789	22,858	22,813	12,567						
1895.....	22,891	22,922	22,913	22,936	13,629	9,571					
1896.....	23,178	30,906	23,232	23,183	20,735	21,051	13,572				
1897.....	22,750	23,202	30,912	23,185	20,745	25,370	21,119	14,382			
1898.....	23,646	23,178	23,184	23,199	20,842	21,080	21,080	20,851	21,318	7,569	
1899.....	23,178	23,205	22,477	30,135	20,082	20,926	20,956	17,448	18,285	14,669	7,628
Total.....	229,323	215,381	191,680	175,953	108,600	97,998	76,727	52,681	39,603	22,238	7,628

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.

WORKS AND YARDS OF L'ERMITAGE ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT DENIS, SUR SEINE.

TRADE NOTES.

The Bullock Electric Mfg. Co. of Cincinnati has recently opened an office at Buffalo, N. Y., 675 Ellicott Square. The office will be under the management of Francis B. Smith, an electrical engineer of wide practical experience.

Mr. L. J. R. Holst, manager of the United States business of C. P. Goerz's double anastigmat lenses and Trieder binoculars, with offices at No. 52 East Union Square, New York, announces that in consequence of the company manufacturing these binoculars in the United States the prices have been brought to about 15 per cent. below the former prices. The price used to be the Berlin price augmented by the United States duty.

The Hayden Water Purifier & Heater Co., No. 71 Broadway, N. Y., has placed upon the market the Hayden feed water purifier for stationary, marine and locomotive boilers. The company claims that with its device it is able to heat the feed water up to about the temperature of the steam in the boiler, consequently the scaling properties in the feed water are readily removed in the purifier. They will install the purifier on any steam boiler where there is bad water, subject to trial.

Warren, Webster & Co., Camden, N. J., have just issued a little booklet about their Webster type of feed water heater, which is most interesting reading. The book is really a salesman-like talk on the subject of feed water heaters. First of all the question of price is discussed. A selection based on price is delusive. There are some heaters that would be expensive to buy if they cost nothing. Quality and efficiency are the points to be considered. The book is to be had from the company upon request.

Some attractive folders have just been issued by Crawley & Johnston, Cincinnati, manufacturers of Cincinnati automatic steam steering gear, Cincinnati lever brake steam steering gear and Cincinnati hydraulic steering gear. This steering gear is employed on the Gilchrist steamers R. E. Schuck, Hiawatha, Columbia, Tacoma and Cumberland of the great lakes, and Mr. Gilchrist (Cleveland) has highly indorsed them. They are also employed on the Cleveland steamers Colonial and Louisiana, owned by the estate of John W. Moore, and have given much satisfaction.

The American Steel & Wire Co. has issued a catalogue setting forth the list of products which they make. That is the catalogue sets it forth as nearly as it can considering the wide variety of the company's productions. The preface says: "This list of products as of January, 1901, is comprehensive in detail only to the extent necessary to give a clear idea of what we make. Many of our products cannot be briefly listed but we show in this pamphlet enough to indicate the general lines. Where detail is lacking on any point the interested may supply same readily by correspondence with our nearest sales office."

The thin, shimmering sheet of water that fringes a wave before it breaks into foam is a beautiful green, so transparent that one may see through it, and the color is duplicated nowhere else in nature. It is the color which M. W. Fogg, No. 20 Fulton street, New York, has selected

as the cover for his latest catalogue. Mr. Fogg is a maker of interior furnishings for yachts. In his preface he says: "All our mohair plushes, corduroys and velours are dyed fast, especially for us, of the best French dyes and are warranted practically sun fast. Our assortment of drapery material and carpets has been selected with great care and includes the latest designs and colorings. Since moving into our new quarters we have added many improvements, including electric light and a power plant, whereby all our sewing and renovating machines are operated. To the best of our knowledge we are the only upholstery house devoted entirely to marine work, and as such have had over fifty-five years' experience." M. W. Fogg makes cushions, felt mattresses, feather pillows, springs, couches, bedding, napery, camp chairs and steamer chairs.

Ahead of our Competitors. Thearle's Works

That is what our customers say: With raw materials unequalled, with proficient chemical knowledge, technical skill and accuracy in manufacture, and with the best known machinery the superiority of

GARLOCK PACKINGS

naturally follows and its high reputation is merited. It is all carefully inspected and must be superior in quality and accurate in measurement, before shipment. Every pound is fresh and fully guaranteed. If you have never used GARLOCK PACKINGS your patronage is particularly solicited for a small trial order.

Send for catalogue and samples to our nearest office.

THE GARLOCK PACKING CO.



New York. Philadelphia. St. Louis.
Boston. Pittsburgh. Denver.
Chicago. Cleveland. San Francisco.

MAIN OFFICES AND FACTORIES:
PALMYRA, N. Y.; ROME, GA.

ON SHIP BUILDING.

STANDARDS IN
ENGLAND AND SCOTLAND

KNOWN AND USED WHEREVER
STEEL SHIPS ARE BUILT.

SEPARATE VOLUMES FOR PLATES.

"Ship Building in Iron and Steel."

(Plates in separate volume.) \$5.25.

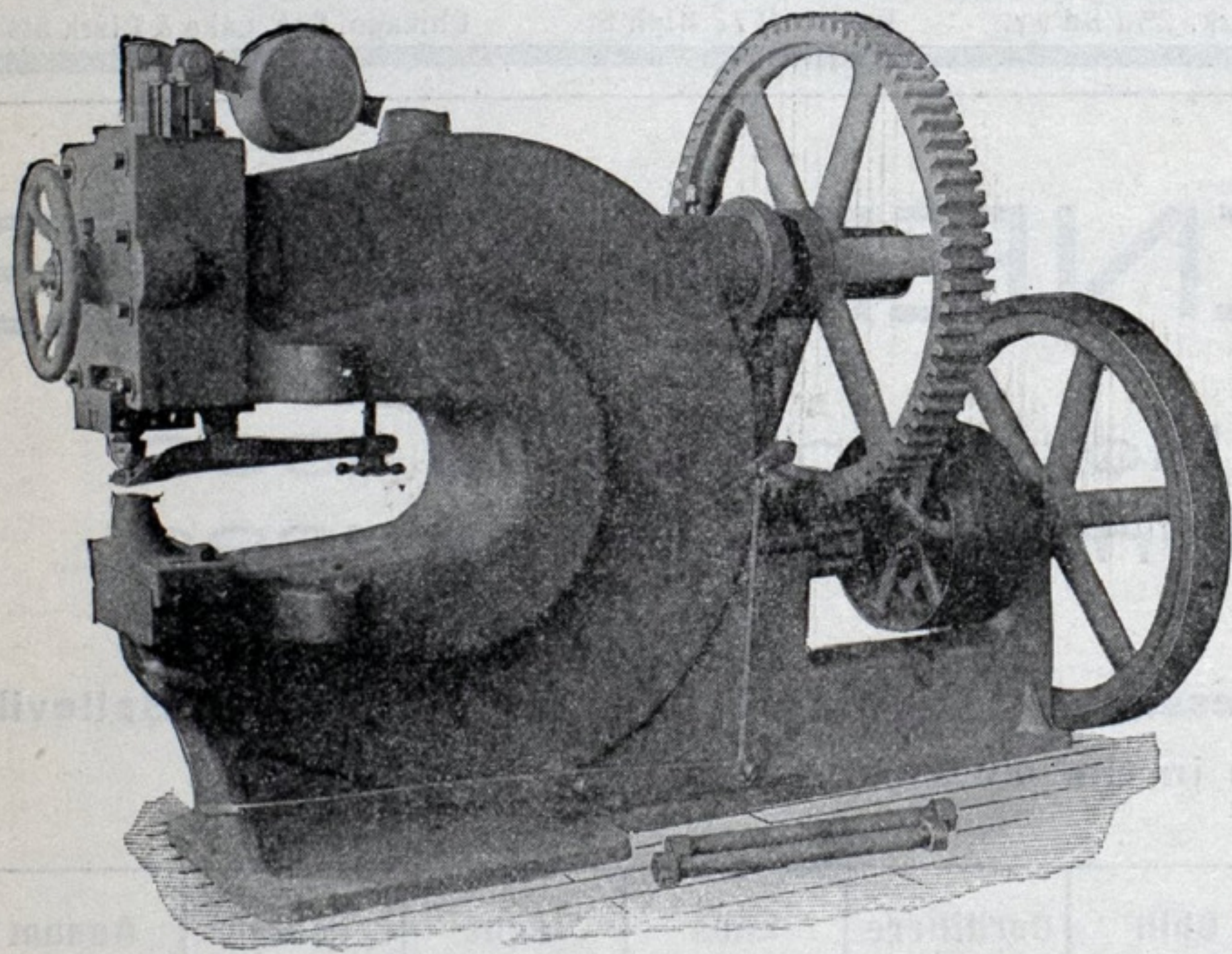
"Ship Building and Laying Off."

(Plates in separate volume.) \$3.00.

"Theoretical Naval Architecture."

(Plates in separate volume.) \$3.50.

THE MARINE REVIEW PUB. CO.,
CLEVELAND.



THIS ILLUSTRATES OUR

Standard Boiler Maker's Punch

which is similar to our iron worker's punch with the exception that it is equipped with a plain jaw instead of an architectural jaw. We believe that this is the best punch for boiler makers on the market to-day, and for strength, reliability, and beauty of design we think it is unequalled. We can refer you to hundreds of the largest shops all over the world where we have installed one or more of these tools, and where they are giving the best of satisfaction and service.

Let us hear from you if you are in the market for a tool of this kind. We think we can interest you both as regards quality and price.

THE CLEVELAND PUNCH & SHEAR WORKS CO.,

CLEVELAND, O., U. S. A.

LARGE STEEL PACKAGE FREIGHTER FOR SALE.

290 ft. keel, 41 ft. beam, 26 ft. hold; carrying capacity, 3,000 tons; highest rating for 5 years. Inquire J. K. Harrow, 225 6th St., Detroit, Mich. Feb. 21.

TUG FOR SALE AT A BARGAIN.

Fishing tug Fred King. One of the best on Lake Erie. Robison Basket Co., Painesville, O. Mar. 25.

Side-Wheel Passenger and Freight Steamer For Sale.

Built last season; 145x41 ft.; will sleep 100 first-class passengers and carry 125 tons of freight. Electric light plant and steam hoisting engines for freight. Vessel well fitted out. Nothing required to complete her. Forward main deck may be fitted to accommodate passengers. Will sell cheap. She is a Canadian bottom. Address or apply to S. R., Toronto Junction, Ont. Feb. 28.

FREIGHT AND PASSENGER STEAMER

A. B. Taylor is for sale. Vessel 106 ft. keel, 22 ft. beam. Freight capacity, 115 tons; passengers, 200. Electric light; good sea boat; speed, 11 miles; economical. E. C. Dunbar, Grand Haven, Mich. Mar. 7

LUMBER CARRIERS FOR SALE.

Stmr. White Star	capacity	350,000 feet.
Barge Eva S. Robinson	"	560,000 "
Schr. Annie P. Grover	"	340,000 "
Schr. John Miner	"	350,000 "

All A2 and A2½ and in good condition. Arthur B. Slyfield, Port Huron, Mich. Feb. 21.

FOUNDRY AND MACHINE SHOP FOR SALE.

To close an estate. Located in one of the large cities on the lakes. Long established, well equipped, doing good business, marine and general. Splendid chance for the right parties. Will sell plant or lease for a term of years. Address "Administrator," care Marine Review Pub. Co., Perry-Payne Bldg., Cleveland. tf.

TUG FOR SALE.

Good Tug, six years old. Engines 18x20. Boiler allowed 130 pounds steam pressure. Address Box 284, Ashland, Wis. Feb. 28.

FIVE ELECTRIC PASSENGER LAUNCHES FOR SALE.

In fine condition. Length over all, 35 feet. Seating capacity, 28. Send for price list. Yacht brokers, please note. Milwaukee Electric Launch Co., 1504 Monadnock Block, Chicago. tf